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Self-Propelling Rotary Steam Plow.

In forwarding to us the drawings from which our engraving is made, Col. Saladee accompanies them with the following comments and description of his invention, which will be read with interest by all persons interested in agricultural science on an extensive scale :—

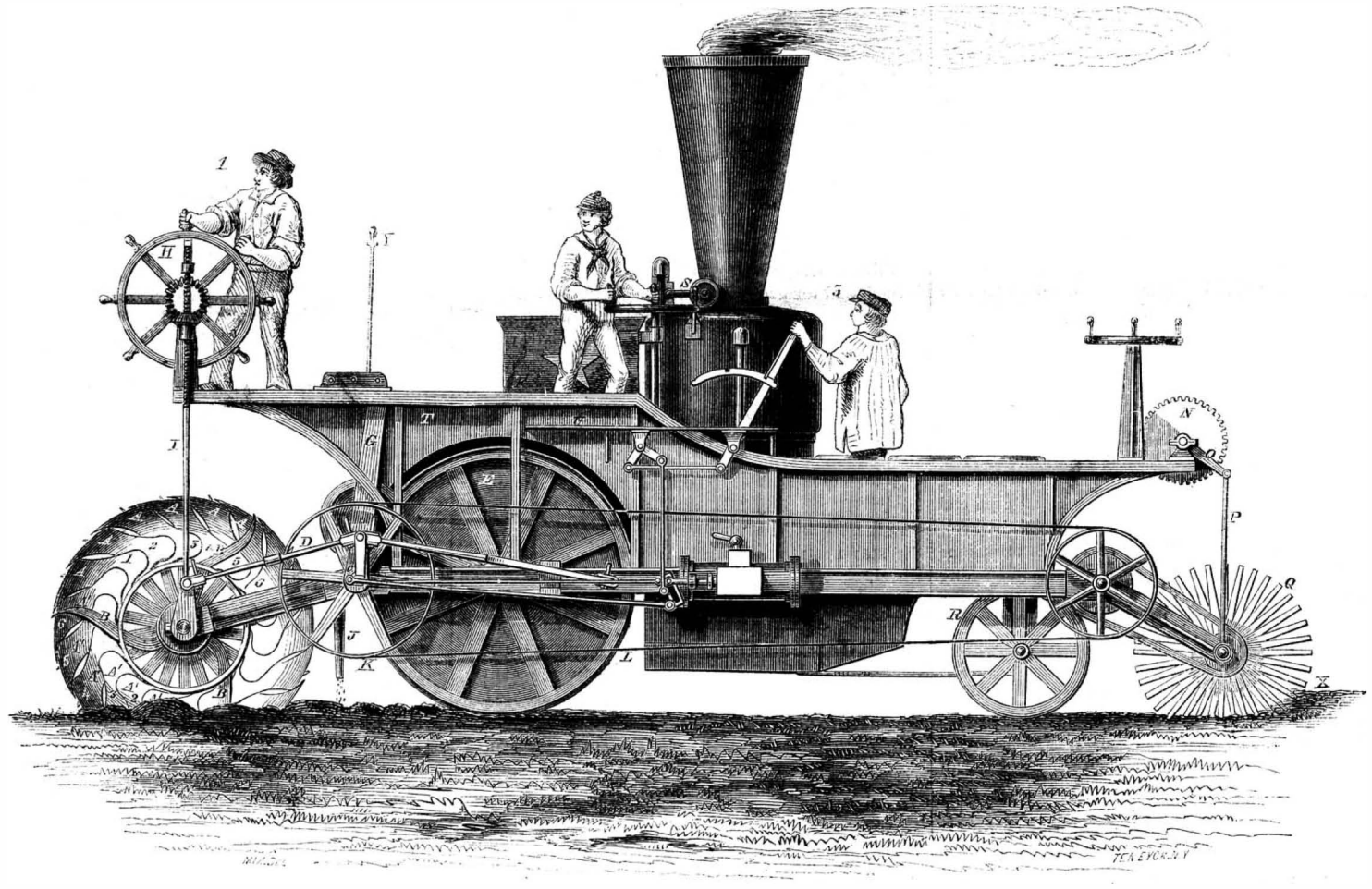
In devising a steam plow there is no idea which seems so naturally to present itself to the mind of the inventor as that of a traction engine, which shall be so constructed as to propel its own ponderous weight, and drag a certain number of plows after it. But past experiments upon this principle have shown a very serious difficulty in the way of its success.

In the first place, we have to consider the amount of resistance that is necessary to be overcome when we are dragging, say eight plows, at twelve inches depth in the ground, before we can decide upon the proportions and weight of a traction engine intended to draw them. And if we shall find that this number of plows, when cutting in a stiff prairie sward at the depth above mentioned, will require a power to draw them equal to that required by any of our heavy freight trains upon the iron rail, we shall perceive the great amount of traction that must be imparted to an engine that will be sufficiently powerful for the execution of its work. It is a principle well understood, that to increase the power of a traction engine to any desired point, a corresponding weight must be imposed upon it ; and that just in proportion as the weight is increased, we magnify the difficulty of propelling it over a soft and yielding surface. And, therefore, when we call into requisition this traction principle upon a yielding soil, we are at once confronted with this palpable objection to it. A twenty-tun engine upon the iron rail can exert a power to draw an immense train ; but if it is placed upon that character of ground over which the steam plow is expected to pass, the weight which in its former condition is the source of its great power, will in the latter condition make it a helpless, worthless machine.

It is true, however, that several of our inventors have partially succeeded in plowing upon this principle ; but their operations seem to have been wholly confined to firm sward plowing, which, in many instances, gives a solid foundation for the massive engine to work upon. But take this 16 or 20-tun machine upon the light ground of an old cultivated field, and we shall find that it will require the whole of the power to propel itself, independently of dragging anything after it.

My invention, which is illustrated by the annexed engraving, exactly *reverses* the principle above considered. In place of using an engine which shall possess the capacity of propelling itself, and to *drag* the plows in the old way, I make the rotary action of my 18 moldboard plows, A A A, upon the ground to *propel* the machine, involving, in fact, the same principle as the action of the wheel upon the water in propelling a boat. I thus most effectually overcome the difficulty which manifests itself upon the *traction* principle ; for upon this plan I am in no sense dependent upon the *weight* of the engine, which is so absolutely necessary in the other case ; but on the contrary, I am permitted to study the *lightness* of the thing, and thus render the machine capable of passing over any species of ground.

Here, then, is a great point attained ; and while this invention embraces that advantage, it, at the same time, embodies into the *one* machine the capacity for doing a greater variety of farm and plantation work than has ever before been attempted in any machinery of a similar character ; indeed, it is capable of performing all the various kinds of farm and plantation work to which the steam engine can possibly be applied. And thus in one simple machine we have the means of plowing, sowing the seed, rolling and harrowing the ground at *one* operation, if that is desired. Or it can be used for plowing alone, or for plowing and harrowing, as the case may be. When in the field it is capable of propelling itself to any point upon the farm or plantation where it may be wanted for other purposes—such as to saw lumber, do grinding, gin cotton, thrash and clean the grain ready for market, draw water, saw the wood consumed by itself ; or it may be used as a locomotive to drag the loaded wagon or "truck" over the prairie, or to operate the mammoth mowing machine built for it by Messrs. Fisher, Shalters & Co., of Alliance, Ohio, cutting a swath nine feet wide.



SALADEE'S SELF-PROPELLING ROTARY STEAM PLOW.

The peculiar construction and operation of this machine will be fully comprehended from the following detailed description of its various parts :—

The main weight of the machine is imposed upon the revolving drum, E, which is 6 feet 2 inches in diameter and 7 feet across, and is separated in the center, so that each part is acted upon independently of the other, for the purpose of facilitating the turning of the machine, as will presently appear. The front extremity of the machine is supported upon two wheels, R, 3

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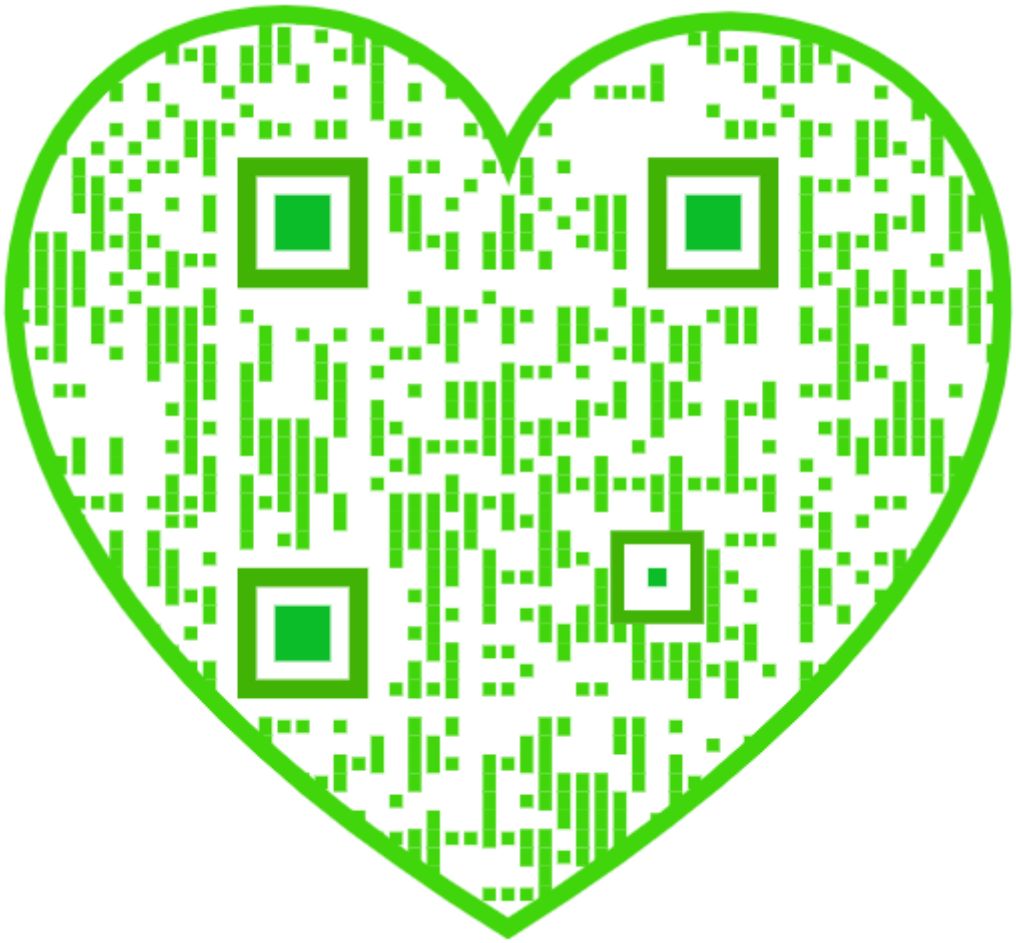

feet 6 inches in diameter, and each having a face tread of 15 inches. These wheels are connected to the steering arrangement which is acted upon by operator 2, while standing upon the platform, U, and taking hold of the steering wheel, S. The main body of the machine is 9 feet wide, and that portion of it where stands operator 3, is divided into three spaces; the center, from the boiler back is 4 feet wide, and the spaces on either side of this are taken up for the wood or fuel boxes. The water is carried in the tank, F, which extends across the full width of the machine, and will hold 900 gallons. The space, T T, is occupied by the seed box, which also extends the full width of the machine. This box is capable of holding 25 bushels of grain, and in the bottom is provided with the arrangements for distributing the seed into the pipes, J, (24 in number) and through which it is cast upon the ground. From this end of the machine extend two radius bores, on the outer ends of which is secured the revolving shaft forming the center of the plows, A. This plow-shaft has cranks, C, at both ends, one set at right angles with the other, and acted upon by double engines through the connecting rods, D. This shaft has secured to it 18 moldboard plows, A, and a corresponding number of coulters, B. They are placed in three spiral rows around the shaft, 6 coulters and 6 plows in each. But, to illustrate this more fully, let us suppose coulter, B, is in the ground and closely pursued by the first plow, A^1, which also is in to its full capacity, and in the act of turning the ground from the moldboard. The next plow, A^2, is on the further side of the first plow, A^1, and set back, so that while the first plow is in to its full capacity, No. 2 is but *half*-way on, No. 3 but one-third the way, while A^14 is just entering, and the remaining two in this row, 5 and 6, are clear of the ground. The next spiral row of these plows, A^1 A^2 A^3 A^4 A^5 A^6, take the same curve around the shaft as does the first row, so likewise the third row. Now it will be observed that as this shaft holding these 18 plows revolves, there will be one plow an equal distance in advance of the other the whole way round, and thus the first plow, A^1, clears its furrow to receive the dirt from the moldboard of plow A^12, and this for A^13, and so on around until every plow has cut in its regular order, plowing a swath 7 feet wide, and varying in depth from 6 to 18 inches as may be required. The arms by which the plows and coulters are secured to the revolving shaft, are so connected to the latter that either one may be readily removed by simply taking out the two bolts that hold each to its place. These plows are raised or lowered by means of the long screw rods, I (one at each end of the shaft), which are connected to the hand wheel, H, in such a manner as to permit said rods to assume the various lines of position they must take in turning round either one way or the other. While the plows are at work, operator No. 1 has his hand constantly upon the wheel, H, and thereby regulates the depth at which they are wanted to cut, and by the same means adjusts them to any irregularities there may be upon the surface over which the machine is passing; and when the machine arrives at the end of the "land" on which it is working, to raise them entirely clear of the ground, and so to hold them until the machine is turned and ready to start in again, when they are instantly lowered to their work as before. And this is done without being at the trouble of *stopping* the action of the plows; for when raised out they continue to revolve the same as when in the ground. Indeed it is not necessary to stop the engines at all while the machine is at work.

In the first experiment made by me upon this principle of plowing, I found that when I applied power enough to revolve the plows at 8 inches deep, I had infinitely more power than was necessary to propel the machine; so that in place of plowing the ground clean, but a piece of the soil would be taken out here and there, just sufficient to catch the necessary resistance upon the ground to carry along the machine. Now, then, for the purpose of obviating this difficulty, it was necessary to interpose a gearing between the action of the plows and the main supporting drum, E, that should regulate the forward movement of the latter in proportion to the cut made at each revolution of the plows. This gearing is connected to the power shaft, C^1, which extends across the machine immediately back of the drum, and connected to it by shifting pinions, which mark into trundles connected to the inside ends of said drums; and by the interposition of different-sized shifting pinions, the plows may be regulated to cut any quantity of land at each revolution that may be desired, varying from 18 to 36 inches—so that by this arrangement it is as impossible for the machine to travel faster than the plows are capable of cutting away the ground, as it is for the log upon the saw-mill carriage to advance faster than the saw is capable of cutting away the wood. One acts with the other, so that the machine is made to travel in the exact proportion dictated by the plows or *vice versa*. Between the frame of the machine, on both sides and the crank, C, to the power-shaft, is placed the belt wheels, K, 4 feet in diameter and 5 inch face. The harrow, Q, receives its motion from said belt wheels, K, through the medium of the belts, L. The shaft to the harrow is the same length of the plow-shaft, and marks the same width of land (7 feet). The teeth are likewise placed in a spiral form around the shaft, the same as are the plows and coulters. It is raised and lowered by the handwheel M, worm-wheel N, lever O, and perpendicular rod P. And the harrow being made to revolve with a much greater rapidity than the plows, has a tendency to "bed-up" and lighten the ground as shown at X. The levers, Y, on the stand of operator No. 1, are designed to throw in or out of gear the shifting pinions before mentioned, so that in turning the machine, that drum on the inside of the circle being described by the machine, is thrown out of gear, thus leaving the engine to act entirely upon the outside one, and thereby facilitate the turning, on precisely the same principle of stopping one wheel, and going ahead on the other, in turning a side-wheel boat. The machine, in its present position, is represented as having the plows in front, and the drums and steering wheels passing over the plowed ground. This is necessary only when the machine is worked upon cultivated soil, when it may be wanted to plow and harrow at once, or when performing the whole operation of plowing, sowing, rolling and harrowing. But when worked upon prairie soil, or other ground that is only to be plowed, this order of things is reversed. In this case the plow-shaft is turned end for end; so as to throw the point of the plows the other way, the belts, L, are removed, the harrow hoisted clear up out of the way (or entirely detached from the machine), and the engines reversed, and the machine travels the other way upon the unplowed ground, while the plows work in the rear. This machine requires but two men and a boy to operate it, man No. 1 to regulate the depth of the plows, and throw in and out either one of the drums by levers, Y, when in the act of turning. Man No. 2, standing upon the platform, U, puts on and cuts off the steam as required, and steers the machine by the wheel, S, and boy, No. 3 "fires-up" and raises and lowers the harrow by wheel, M. When used as a stationary engine, for such purposes as before mentioned, the machine is propelled to the place where it is wanted, both pinions connected to the drums, thrown out of gear, and it will remain at rest while the engines act only upon the belt-wheels and the plows, which latter being, in this case, suspended clear of the ground, serve as an immense "fly-wheel;" but if not wanted for this purpose, the connecting rods, D, are removed, and the belt-wheels alone are acted upon by the engines, from which arrangement power may be had for all kinds of work to which any portable engine may be applied. When used as a traction engine, the plows and all their connections are removed, so likewise the harrow and its connections, when we have as perfect a model for a locomotive engine to draw loaded trucks or wagons over our prairies, or upon level roads, as can well be imagined or desired to its weight, which is between 7 and 8 tuns. In this condition the machine is used for operating the large mowing machine before referred to. The mower is attached to the right-hand side of the machine, in such manner as to have the "cutter bar" operate directly opposite the point of bearing of the drum, E, and the required distance from the ground. The cutters are set in motion, with any degree of rapidity that may be desired, from the belt-wheel, K. The machine is also provided with the necessary means by which to raise or lower the cutter-bar instantly, when passing over the ground.

The above engraving is taken from the working drawings, from which this machinery is now being built by Hunsworth, Eaken & Co., of the People's Works, Philadelphia, to the order of the inventor.

The plans by which I propose to arrange and manage a farm or plantation upon which the steam plow is to be permanently introduced, I will furnish you in a week or two for publication. After much investigation I consider this invention, and the system by which it is to be operated, as the most perfect and practical, in all its parts and appliances, that has yet been suggested; and I am confident that steam cultivation upon this principle, can be made a positive success.

Application for patents on this invention is now pending.

Further information in reference to this invention may be had by addressing the inventor, Col. C. W. Saladee, Island City Hotel, Galveston, Texas.

Diphtheria.

The extensive prevalence of this alarming disease in this vicinity, and the general desire which is felt for knowing more about it, induces us to extract from the *Medical and Surgical Reporter* the following pertinent and positive statements of the Standing Committee of the Medical Society of the State of New Jersey, which are embraced in the report made at the meeting on the 22d and 23d of January :—

Diphtheria is regarded, in all the reports, not as a local affection but as a blood disease, and of a specific character, distinct, in the opinion of most of the observers, from scarlatina and cynanche trachealis. Its diagnostic symptom is expressed in its name. The membrane or membranous exudation forms patches, and becoming, more or less, continuous over the velum palatia, fauces and adjacent parts, includes, in the more severe and mostly fatal cases, the larynx and trachea. It prevails epidemically, either by infection or contagion, or under malarious influences, just as scarlet fever and the other exanthemata. It is not attended with an eruption. It is, with few exceptions, a disease of low grade, requiring tonic and not depleting remedial measures. It is epidemic in high, well-drained and non-malarious districts, as well as in insalubrious, low, marshy regions, and lastly, though not less important, on that account, it is, though often fatal, a disease as readily controlled by judicious and careful treatment as any other grave disease. Dr. Bacon, of Cumberland, reports eight deaths in two hundred cases; Dr. Rosenberger, of Hunterdon, reports three deaths in eighty cases; Dr. Southard, of Essex, four deaths in forty cases. This is a mortality of about four per cent. Others report a moderate prevalence of the disease, but in a mild and benignant form.

The views of the reporters in regard to the treatment are remarkably uniform. Indeed, no one can read these reports without being impressed with the fact that there are well-established and well-defined principles of treatment which direct the physician in his management of morbid phenomena. The treatment recommended is constitutional and local. When asthenia characterizes the affection, as was the case in most districts noticed, tonics and stimulants, with beef tea, and other supporting measures, were adopted and recommended as usually successful. The tinct. ferri sesquichloridi, ten to fifteen drops in water, every three or four hours, with chlor. potassæ and quinia, brandy and brandy with milk; chloric, ether, &c., are the articles chiefly recommended. For the local affection, nitrate of silver in solution, twenty to fifty grains to the ounce, sulph. of zinc and tannic acid were used with more or less benefit. The disease, though new here as an epidemic, yet there can be no doubt that it has always occurred sporadically. This is the opinion based upon the experience of the committee.

In regard to the constitutional character of the disease, Professor Pepper, of the University of Pennsylvania, says:—"Diphtheria is not a local affection; it must be owing to some particular condition of the blood. The diphtheritic exudation is not confined to the throat. A blister on the leg of a person will become covered with the deposit, and the patient may become attacked with severe and constitutional affections, and die sometimes, independently of the local disease, when the blood is in this condition."

Gas for the British Navy.—The result of the experiments now being made by order of the Board of Admiralty at the steam factory at Woolwich dockyard, England, for the purpose of testing the availability of Major Fitzmaurice's contrivance for supplying the ships of Her Majesty's fleet with gas, will be to secure the application of gas on shipboard in all cases. The gas could be manufactured in the engine or boiler room at a very small expense. The gasometer could be placed at any convenient position in the ship, and the burners are thence supplied precisely as the various burners in a dwelling house are furnished from the main.

The Illinois Central Railroad forwarded in the month of January seventy thousand tuns of freight. Among the prominent articles were :—147,062 bushels of wheat, 1,131,630 bushels of corn, 133,945 bushels of oats, 28,892 barrels of flour, 2,634 barrels of whiskey, 12,232 barrels of pork, 1,841 barrels of lard, 1234 tuns of hay, 703 barrels of sugar, 3,189 hogsheads of sugar, 2,417 barrels of molasses, 3,787,590 pounds of dressed pork, 2,229 head of cattle, 13,578 live hogs.

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THE CHEMICAL HISTORY OF A CANDLE.

By Professor Faraday.

A Course of Six Lectures (adapted to a Juvenile Audience) Delivered before the Royal Institution of Great Britain.

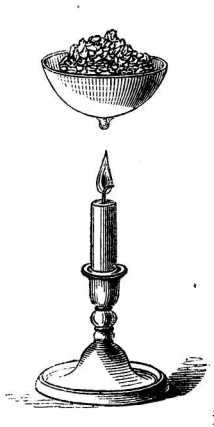
LECTURE III.

Products: Water from the Combustion—Nature of Water—A Compound—Hydrogen.

I dare say you well remember that when we parted we had just mentioned the word "products" from the candle. For when a candle burns we found we were able, by nice adjustment, to get various products from it. There was one substance which was not obtained when the candle was burning properly, which was charcoal or smoke, and there was some other substance that went upward from the flame which did not appear as smoke, but took some other form and made part of that general current which, ascending from the candle upward, becomes invisible and escapes. There were also other products to mention. You remember that in that rising current having its origin at the candle, we found that a part was condensible against a cold spoon, or against a clean plate, or any other cold thing, and part was incondensible.

We will first take the condensible part and examine it, and, strange to say, we find that that part of the product is just water—nothing but water. I last time spoke of it incidentally, merely saying that water was produced among the condensible products of the candle; but, to-day, I wish to draw your attention to water that we may examine it carefully, especially in relation to this subject, and also with respect to its general existence on the surface of the globe.

Now, having previously arranged an experiment for the purpose of condensing water from the products of the candle, my next point will be to show you this water, and perhaps one of the best means that I can adopt for showing its presence to so many at once, is to exhibit a very visible action of water, and then to apply that test to what is collected as a drop at the bottom of that vessel. I have here a chemical substance discovered by Sir Humphry Davy, which has a very energetic action upon water, which I shall use as a test of the presence of water. If I take a little piece of it—it is called potassium, as coming from potash—if I take a little piece of it, and throw it in that basin, you see how it shows the presence of water by lighting up and floating about, burning. I am now going to take away the candle which has been burning underneath the vessel containing ice and salt, and you see a drop of water—a condensed product of the candle—hanging from the under surface of the dish. I will show you that potassium has the same action upon it as upon the water in that basin in the experiment we have just tried. See! it takes fire and burns in just the same manner. I will take another drop upon this glass slab, and when I put the potassium on to it you see at once, from its taking fire that there is water present. Now, that water was produced by the candle.



In the same manner, if I put this spirit lamp under that jar, you will soon see the latter become damp from the dew which is deposited upon it—that dew being the result of combustion; and I have no doubt you will shortly see, by the drops of water which fall upon the paper below, that there is a good deal of water produced from the combustion of the lamp. I will let it remain, and you can afterwards see how much water has been collected. So, if I take a gas lamp and put any cooling arrangement over it, I shall get water—water being likewise produced from the combustion of gas. Here, in this bottle, is a quantity of water—perfectly pure, distilled water, produced from the combustion of a gas lamp—in no point different from the water which you distill from the river, or ocean, or spring, but exactly the same thing. Water is one individual thing, it never changes. We can add to it by careful adjustment, for a little while, or we can take it apart and get other things from it, but water, as water, remains always the same, either in a solid, liquid or fluid state. Here again [holding another bottle] is some water produced by the combustion of an oil lamp. A pint of oil, when burnt fairly and properly, produces rather more than a pint of water. Here, again, is some water produced by a rather long experiment, from a wax candle. And so we can go on with almost all combustible substances, and we find that if they burn with a flame, as a candle, they produce water. You may make these experiments yourselves; the head of a poker is a very good thing to try with, and if it remains cold long enough over the candle, you may get water condensed in drops on it; or a spoon, or ladle, or anything else may be used, provided it be clean, and can carry off the heat, and so condense the water,

And now—to go into the history of this wonderful production of water from combustibles, and by combustion—I must first of all tell you that this water may exist in different conditions, and although you may now be acquainted with all its forms, they still require us to give a little attention to them, for the present, so that we may perceive how the water, whilst it goes through its Protean changes, is entirely and absolutely the same thing, whether it is produced from a candle by combustion, or from the rivers or ocean.

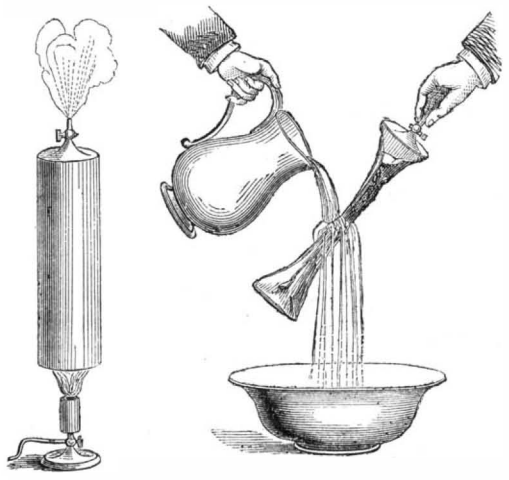
First of all, water when at the coldest is ice. Now, we philosophers—I hope that I may class you and myself together in this case—speak of water as water, whether it be in its solid, or liquid or gaseous state—we speak of it chemically as water. Water is a thing compounded of two substances, one of which we have derived from the candle, and the other we shall find elsewhere. Water may occur as ice; and you have had most excellent opportunities lately of seeing this. Ice changes back into water; and on our last Sabbath we had a strong instance of this change by the sad catastrophe which occurred in our own house, as well as in the houses of many of you. Ice changes back into water when the temperature is raised; water also changes into steam when it is warmed enough. The water which we have here before us as ice, is in its densest state, and although it changes in weight, in condition, in form, and in many other qualities, it is still water; and whether we alter it into ice by cooling, or whether we change it into steam by heat, it increases in volume—in the one case very strangely and powerfully, and in the other case very largely, and strangely and wonderfully. For instance, I will now take this tin cylinder, and pour a little water into it, and seeing how much water I pour in, you may easily estimate for yourselves how high it will rise in the vessel; it will cover the bottom about two inches. I am now about to convert the water into steam, for the purpose of showing to you the different volumes which water occupies in its different states of water and steam.

Let us now take the case of water changing into ice; we can effect that by cooling it in a mixture of salt and pounded ice—and I shall do so to show you the expansion of water into a thing of larger bulk when it is so changed. These bottles [holding one] are made of strong cast iron, very strong and very thick—I suppose they are the third of an inch in thickness; they are very carefully filled with water so as to exclude all air, and then they are screwed down tight. We shall see that when we freeze the water in these iron vessels, they will not be able to hold the ice, and the expansion within them will break them in pieces as these [pointing to some fragments] are broken, which have been bottles of exactly the same kind. I am about to put these two bottles into that mixture of ice and salt for the purpose of showing that when water becomes ice, it changes in volume in this extraordinary way.

In the meantime, look at the change which has taken place in the water to which we have applied heat; it is losing its fluid state. You may tell this by two or three circumstances. I have covered this glass flask—in which water is boiling—over with a watch glass. Do you see what happens? It rattles away like a valve chattering, because the steam rising from the boiling water sends the valve up and down, and forces itself out, and so makes it clatter. You can very easily perceive that that flask is quite full of steam, or else it would not force its way out. You see also that the flask contains a substance very much larger than the water, for it fills the whole of the flask over and over again, and there it is blowing away into the air; and yet you cannot observe any great change in the bulk of the water, which shows you that its change of bulk is very great when it becomes steam.

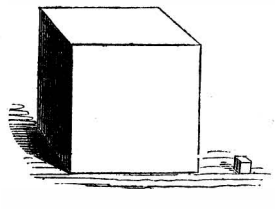
I have put our iron bottles containing water into this freezing mixture that you may see what happens. No communication will take place, you observe, between the water in the bottles and the ice in the outer vessel. But there will be a conveyance of heat from one to the other,, and if we are successful—we are making our experiment in very great haste—I expect you will by-and-by, so soon as the cold has taken possession of the bottles and their contents, hear a pop on the occasion of the bursting of the one bottle or the other, and, when we come to examine the bottles, we shall find their contents masses of ice partly inclosed by the covering of iron which is too small for them, because the ice is larger in bulk than the water. You know very well that ice floats upon water; if a boy falls through a hole into the water, he tries to get on the ice again to float him up. Why does the ice float? Think of that, and philosophize. Because the ice is larger than the quantity of water which can produce it, and therefore the ice weighs the lighter, and the water is the heavier.

To return now to the action of heat on water. See what a stream of vapor is issuing from this tin vessel. You observe, we must have made it quite full of steam to have it sent out in that great quantity. And now, as we can convert the water into steam by the application of heat, we convert it back into liquid water by the application of cold. And if we take a glass or any other cold thing, and hold it over this steam, see how soon it gets damp with water; it will condense it until the glass gets warm—it condenses the water now running down the sides of it. I have here another experiment to show the condensation of water from a vaporous state back into a liquid state, in the same way as the vapor, one of the products of the candle, was condensed against the bottom of the



dish and obtained in the form of water; and to show you how truly and thoroughly these changes take place, I shall take this tin flask, which is now full of steam, and I shall close the top. We shall see what takes place when we cause this water or steam to return back to the fluid state by pouring some cold water on the outside. [The lecturer poured the cold water over the vessel, when it immediately collapsed.] You see what has happened. If I had closed the stopper and still kept the heat applied to it, it would have burst the vessel; yet, when then the steam returns to water the vessel collapses, there being a vacuum produced inside by the condensation of the steam. I show you these changes for the purpose of pointing out that in all these occurrences there is nothing that changes the water into another thing; it still remains water, and so the vessel is obliged to give way and is blown inward, as in the other case, by the further application of heat, it would have been blown outward.

And what do you think the bulk of that water is when it assumes the vaporous condition? You see that cube [pointing]; it is a cubic foot. There, by its side, is a cubic inch, it is square, exactly the same shape as the cubic foot, and that bulk of water [the cubic inch] will make that bulk [the cubic foot] of steam, and the application of cold will contract that large quantity of steam into that small quantity of water. [One of the iron bottles burst,



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at that moment.] Ah! There is one of our bottles burst, and here you see is a crack down one side, an eighth of an inch in width. [The other now exploded, sending the freezing mixture in all directions.] This other bottle is now broken; and although the iron was nearly half-an-inch thick, the ice has burst it asunder. These changes always take place in water; they do not require to be always produced by artificial means, we only use them here because we want to produce a small winter round that little bottle, instead of a large one. But if you go to Canada or to the North, you will find the temperature there out-doors will do the same thing as has been done here by the freezing mixture.

Machine-made Chains.

Machinery has been perfected in America, says the *London American*, for the manufacture of chains of every description. The smallest chains as well as the largest are constructed with a surprising rapidity and exactness. Those for trimming jewelry, little larger than an ordinary pin to the largest ship cables.

The machines for the manufacture of watch and other small chains have been brought from America, and are now used at Birmingham, each doing the work of fifty hands, and more perfectly than it is possible to accomplish it by manual labor.

The machines for manufacturing cables have not, we believe, been used in this country, though for some time employed to a limited extent in America. Many of the cables, we may say the great majority, with which the American marine is furnished are now manufactured by the old process in the iron districts of England. For this and other purposes a large amount is yearly imported.

If the chain makers of Wolverhampton desire to retain this foreign trade, or even the domestic trade, they must follow the wise example of the Birmingham gold chain makers in introducing these labor-saving machines. We learn a company has been organized in New York, with a capital stock of $1,000,000, for the purpose of manufacturing chains of every description. They are to manufacture with machinery invented by a gentleman who has spent thirteen years in perfecting it, and for which invention they have paid him the sum of three hundred thousand dollars, or more than £60,000.

Iron and Wooden Ships.

In a letter to the *Times*, referring to the absence of all provisions for the construction of iron-coated ships in the new year's programme for the American navy, Mr. J. Scott Russell writes as follows:—"The explanation is the simplest possible. The entire mercantile steam navy of Great Britain, with the exception only of some old vessels, is of iron. The entire mercantile steam navy of America, without any exception known to me, is of wood. The reason is obvious. Timber is one of the staples of America, and we are obliged to import large quantities of it from America into England. Iron is the staple of England, and America is obliged to import large quantities of it from us. Hence, America builds timber vessels far cheaper than we can. We build iron vessels far cheaper than America can. With these facts before us we can readily infer—1. That there are no establishments, manufactories, or skilled artificers in America prepared for the business of iron shipbuilding. 2. That the introduction of iron in substitution for wood gives to England (the country of iron) the means of attaining and maintaining an ascendency over any other country in the matter of iron fleets. 3. We see why in wooden ships America had the advantage over us, and she had the wit to use it. 4. She now sees clearly that we have in future the advantage over her, and she waits to see if we have the wit to work it."

Importance of Good Quality in Iron.—A writer in the London *Quarterly Review* on the iron trade states, that the necessity of employing good iron for rails is now so generally acknowledged, that, in order to insure a superior quality, one of the greatest railway companies in England have established works to manufacture their own iron; and another company, not less important, are just about to follow their example. The writer also thinks that the loss of so many iron ships is to be attributed to the bad quality of metal used in their construction; coinciding in this matter with the opinions repeatedly expressed in the Scientific American.

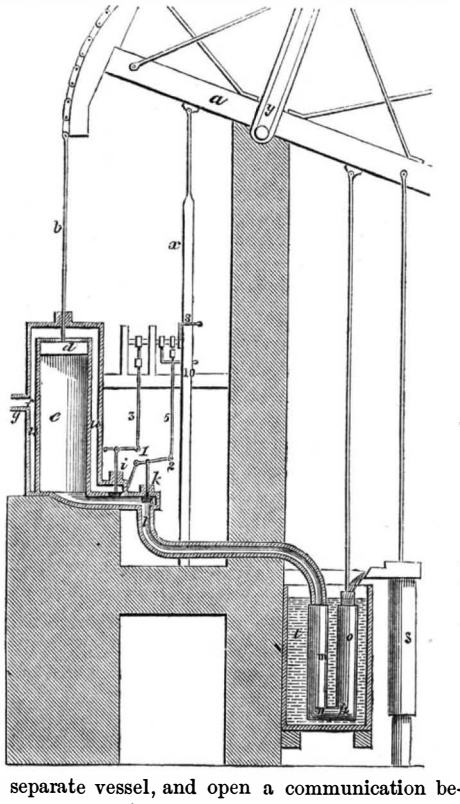
ROMANCE OF THE STEAM ENGINE.

Article XIII.

JAMES WATT.

The grandeur, the value and the importance of every discovery and invention must be judged by the results it has produced. The steam engine was a giant in swaddling bands for eighteen hundred years, but whenever it began to walk alone, under the improvements of Newcomen and Cawley, its wonderful power became manifest, and it was soon adopted for pumping most of the deep mines in England. As represented in its most perfect condition on page 116, present volume, Scientific American, it was still a most clumsy and imperfect engine, but it was the best known, and a great improvement over all that had preceded it. The resources of a greater mind than that of any inventor who had preceded him, were now about to be devoted to the investigation of this mighty subject.

The University of Glasgow, in Scotland, has always been distinguished for teaching the practical arts, such as chemistry and mechanism. In the middle of the last century, its professors gave refuge to a most ingenious young mechanic named James Watt, and furnished him with a shop within its walls, where he practiced his trade of philosophical instrument maker, and kept the instruments belonging to the Macfarlane College Observatory in repair. In 1763, a neat working model of Newcomen's engine having been employed by Dr. Dick, professor of natural philosophy, in his lectures, it received some injury and was taken to Watt for adjustment. He very soon understood this motor as no man ever had done before him; and he saw that there was a great loss of heat entailed by condensing the steam in the inside of its working cylinder. It occurred to him that this waste might be saved, and how to do this was a question which frequently occupied his thoughts. In his own account of the invention, he relates with artless simplicity how he resolved the great problem. One Sunday afternoon, having taken a walk abroad in "Glasgow green," his thoughts turned to the experiments which he had been making for saving heat in the engine, when the idea occurred to him, that as steam was an elastic vapor, it would expand and rush into a previously exhausted space, and that if he were to produce a vacuum



in a separate vessel, and open a communication between the steam in the cylinder and this exhausted vessel, he could obtain a vacuum under the piston, and keep the cylinder always at steam-heat, so that no condensation of *live steam* (that which has done no work) would take place. This brilliant idea Watt resolved into the lever of Archimedes, and with it has elevated a world. He was not long in devising and constructing the model to apply his discovery, and he found it come up to his utmost expectations. We omit giving engravings of the first contrivances which he employed, and come at once to the engine which, under his care and direction, was applied to work on a large scale. The accompanying figure is a vertical section of Watts' single acting and separate condensing engine:—*a* is the beam, connected to the piston rod, *b*, by the chain; *d* is the piston; *e*, the cylinder; *f*, the pipe leading from the boiler, which is also furnished with a box containing a valve, which by its rise or fall opens or shuts a communication between the boiler and cylinder; *k*, a valve, which also by its rise and fall opens or shuts a communication between the under side of the piston and the condenser, *m*, by means of the eduction pipe, *l*. The short pipe, *n*, connecting the condenser with the air and water pump, *o*, has a valve at *p*, opening into the pump barrel; in the piston of this pump are valves opening upwards, and at the top of the barrel is a short pipe, having a valve at its extremity opening outwards; *s* is a common pump, with its rod attached to the balanced lever, to raise water from a well or cistern to replenish the box, *t*, in which the condenser pipes and pumps are placed; the rod which draws the water from the mine, and which is also attached to the working beam is not shown; *y* is the axis of the working beam; 1, 2, 3, 5, are levers moving on joints and attached to the valves, *i k*, by means of rods working steam-tight through the sides of boxes; 8, 10, are tappets or projecting pieces on the plug-rod. The pump-rod works through a stuffing box, so that the atmosphere is completely excluded from the interior of the engine; *u* is a space between the jacket and cylinder into which the steam is admitted by the pipe *f*, and from which it is introduced above the piston in the cylinder.

Previously to the engine being put in motion, the air which occupies its internal parts must be expelled. This is done by opening the valves and allowing steam from the boiler to flow into all the pipes and vessels, and the vapor being lighter than the air, expels it downward through the eduction pipe into the condenser, and from that through the valves which open upward in the air pump. The valve *i* is then shut, and cold water being allowed to flow into the cistern, quickly condenses the steam in the condenser pipes, and the steam under the piston rushing through the eduction pipe to restore the equilibrium, is also converted into water—the condensation in both vessels is so rapid, that in practice it may be considered quite instantaneous. The resistance at the under side of the piston being thus removed, the pressure of the steam issuing from the boiler forces the piston into the vacuous part of the cylinder.

The fall of the piston depresses one end of the working beam, *a*; and as the air-pump rod is attached to the opposite end of the lever, its piston is raised to the top of its barrel, and the air and water which had flowed into the condenser, and was prevented by the valve *p* from returning, is now lying above the air pump piston.

But at the instant when the steam piston had reached to nearly the bottom of its cylinder, or had made its stroke, the tappets on the plug frame, *x*, struck the ends of the levers, or spanners, attached to the valves *i* and *k*, and shut them.

The mine-pump rod is loaded with a weight or counterpoise, and it will be obvious, that to get the piston again into the place from which it has fallen, will require a force to be exerted equal to that which had depressed it, or some means must be resorted to, by which the depressing force may be removed or neutralized, so that the counterpoise (the use of which is to raise the plug frame and the steam piston to the top of the cylinder *e*), may have only their weight and resistance to overcome.

This is the steam jacketted Cornish engine of the present day, with only a different arrangement at the beam-head and devices for operating the valves.

Cork-Cutting Machinery.—From the frequent inquiries in the English papers, and the number of patents taken out in this country, there seems to be an earnest demand for a practical cork-cutting machine which will supersede the expensive hand labor now employed in that manufacture. We invite the attention of all persons interested in the matter to the illustration, on another page, of Millar's cork-cutting machine. It seems to us that he has hit upon the true plan of making a machine for this service, as he produces the peculiar drawing stroke required, by the most simple mechanism; and his machine certainly turns out very perfect work.

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ANNUAL REPORT
OF THE
COMMISSIONER OF PATENTS.

UNITED STATES PATENT OFFICE,
January, 1861.

SIR: In compliance with the fourteenth section of the act, entitled "An act in addition to the act to promote the progress of science and the useful arts," approved March 3, 1837, I have the honor to submit a report of the operations of this office during the year 1860.

No. 1.

Number of applications during the year	7,653
Number of patents granted, including designs, re-issues, and additional improvements	4,819
Number of caveats filed	1,084
Number of applications for extension of patents	74
Number of patents extended	29
Number of patents expired, 31st December, 1860	614

Of the patents granted, there were –

To citizens of the United States	4,781
To subjects of Great Britain	21
To subjects of the French Empire	12
To subjects of other foreign governments	5

No. 2.

Statement of moneys received during the year, namely,—

On applications for patents, re-issues, additional improvements, extensions, caveats, disclaimers, and appeals	$240,867 00
For copies, and for recording assignments	15,485 59
Total	$256,352 59

No. 3.

Statement of expenditures from the patent fund for the year, namely:—

For salaries	$100,685 55
For amount paid under the thirty-first section of the act of June 25	10,003 81
For contingent expenses	60,296 01
For temporary clerks	51,497 93
For withdrawals	28,960 00
For refunding money paid into the Treasury by mistake	302 50
For judges in appeal cases	1,075 00
Total	$252,820 80

No. 4.

Statement of the condition of the patent fund:—

Amount to the credit of the patent fund, 1st January, 1860	$85,905 62
Amount paid in during the year	256,352 59
Total	$342,258 21
Deduct expenses during the year	252,820 80
Which leaves in the Treasury, 1st of January, 1861, the sum of	$89,437 41

No. 5.

Table exhibiting the business of the Office for twenty-four years, ending December 31, 1860.

Years.	*Appli'ns filed.*	*Caveats filed.*	*Patents issued.*	*Cash received.*	*Cash expended.*
1837			435	$29,289 08	$33,506 98
1838			520	42,123 54	37,402 10
1839			425	37,260 00	34,543 51
1840	765	228	473	38,056 51	39,020 67
1841	847	312	495	40,413 01	52,666 87
1842	761	291	517	36,505 68	31,241 48
1843	819	315	531	35,315 81	30,776 96
1844	1,045	380	502	42,509 26	36,344 73
1845	1,246	452	502	51,076 14	39,395 65
1846	1,272	448	619	50,264 16	46,158 71
1847	1,531	533	572	63,111 19	41,878 35
1848	1,628	607	660	67,576 69	58,905 84
1849	1,955	595	1,070	80,752 78	77,716 44
1850	2,193	602	995	86,927 05	80,100 95
1851	2,258	760	869	95,738 61	86,916 93
1852	2,639	996	1,020	112,056 34	95,916 91
1853	2,673	901	958	121,527 45	132,869 83
1854	3,324	868	1,902	163,789 84	167,146 32
1855	4,435	906	2,024	216,459 35	179,540 33
1856	4,960	1,024	2,502	192,588 02	199,931 02
1857	4,771	1,010	2,910	196,132 01	211,582 09
1858	5,364	943	3,710	203,716 16	193,193 74
1859	6,225	1,097	4,538	245,942 15	210,278 41
1860	7,653	1,084	4,819	256,352 59	252,820 80

It will be seen by the foregoing statement of the operations of this office during the year 1860, that under the protection of the laws provided by Congress, deficient as they are in many respects, the invcntive genius of our countrymen has been active beyond precedent, and that the business of the office has increased in a corresponding ratio.

Although the patent laws of this country, as revised by the act of July 4, 1836, and still further modified by the acts of March 3, 1837; March 3, 1839; August 29, 1842; May 27, 1848 and August 30, 1852, are believed to embrace the most perfect system of patent jurisprudence known to the world, yet they are far from approaching that standard which experience has shown is necessary to place them beyond reproach. Many of the defects inherent in the law have been so clearly and forcibly set forth by the various able and distinguished gentlemen who have been at the head of the Office, that I find nothing to add, in the way of argument, to show the necessity of their correction to the effective administration of the affairs of the Office. Were it otherwise, I should find myself relieved of this duty, since it is understood that a bill has already passed one branch of Congress; which, if it shall succeed in the other, will have a remedial effect that will go far to prevent the grant of worthless patents, to the detriment of the country, and to secure the allowance of valid claims as a reward to the meritorious inventor. I can but hope that the bill will pass at an early day. It has in its main features received the sanction of gentlemen whose legal training and experience lend to their judgment that respect and dignity which are generally the concomitants of, and grace profound attainments. It meets my own cordial approbation.

There are, however, other imperfections in the existing laws which I believe the pending bill does not propose to cure, and which, as far as my information extends, have not been heretofore the subject of communication to the Legislature.

By the seventh and eighth section of the act of July 4, 1836, an appeal lay from the decision of the Commissioner of Patents refusing a patent, and in interference cases, to a Board of Examiners, composed of three disinterested persons, who were appointed for that purpose by the Secretary of State; and they, or a majority of them, were empowered, on examination and in consideration of the matter, "to reverse the decision of the Commissioner, either in whole or in part; and their opinion being certified by the Commissioner," he was to "be governed thereby in the further proceedings to be had on such application."

But this Board, temporary in its nature, its members being appointed for each occasion, and their services inadequately remunerated, experience proved to be an entire failure; and hence, by the eleventh section of the Act of 1839, it was abolished, and the appellate jurisdiction transferred "to the Chief Justice of the District Court of the United States of the District of Columbia." This was a step in advance. It was a decided inprovement upon the original tribunal and gave rise to no complaint, until the year 1850, when Chief Justice Cranch announced to this Office that he was unable, by reason of the infirmities of age, to discharge the duties imposed upon him by the Acts of Congress. From this period up to the 30th of August, 1852, a defeated party had no remedy from an adverse decision of the Commissioner; and the Act of Congress of the latter date, which was designed as a remedy for this state of things, was only partial in its effect, for the right to appeal to the Chief Justice still remained; its remedial agency consisting only in the provision that appeals might "*also* be made to either of the Assistant Judges of the Circuit Court of the District of Columbia." The evils resulting from this condition of affairs were grievous, as might have been expected. In *ex parte* proceedings, a disappointed applicant who might be disposed to obstruct the ends of justice, could, although conscious of the substantial correctness of the official decision, by appealing to the infirm Chief Judge, secure to himself the right to manufacture and sell the thing invented during that official's lifetime, if during his lifetime he should be unable, as he was, to discharge the duties imposed on him. Many appeals had been taken to Judge Cranch, before the passage of the remedial act of 1852, by parties aware of his inability to act. Some of the applicants refused to transfer their causes to one of the Associate Judges. In such cases, where there was no opposing party, the evils resulting were such as have just been portrayed; but when the contest was between two *bona fide* and independent inventions, they were still worse. The appellants were not only permitted to make and vend the article invented with impunity so long as the Chief Justice should live, and thus secure a monopoly for more than fourteen years if they should finally secure their patents, but they were enabled to prevent the issuing of patents to the other and successful parties, who were willing and anxious to put the public in immediate possession of the fruits of their genius, which is one of the considerations for the grant of a patent.

Commissioner Hodges was prompt in his energies to meet and crush these great wrongs. He accordingly issued his orders that in all cases where appeals had been taken to the Chief Justice in cases of interference, the appellants should amend by transferring them to one of the Assistant Judges; and that all appeals in like cases that should thereafter be brought should be taken to the same officers.

Commissioner Mason was anxious to support his predecessor; but he doubted the competency of the Commissioner of Patents to limit the right of appeal, however strong the necessity. In a case then before him, he said he had every disposition to do this if he had the power. The matter was therefore laid before Attorney-General Cushing for his advice, who, in pronouncing his opinion, said: "I perceive the inconvenience involved in the fact, that the party against whom the Commissioner has decided, in a case of interference, may, by an appeal to the Chief Justice, which he, by infirmity, is unable to hear and determine, purposely delay and obstruct the final decision of the case in favor of the rightful claimant to the patent, and thus injustice be done. But Congress, and Congress alone, has, in my opinion, power to remedy the evil."

I have been thus minute in tracing the working of the several statutes giving the right to an appeal, for the purpose of stating with the more emphasis that the Act of 1852, devolving upon the Chief Justice and either of the Associate Judges of the Circuit Court of the District jurisdiction in appeal cases from the adverse decisions of this Office, is still in force; that since the demise of Judge Cranch, in 1855, we have had a recurrence of the inconvenience resulting from the Act, in the inability of one of the Associate Judges to attend to the duties of his office for about a year; and that a similar contingency may arise at any day, when, of course, such appeals as may have been taken to the disabled judge must await the issue of events, to the injury alike of the public and of individuals.

Another serious objection to the Act of 1852, and in which particular it should, in my opinion, be amended, flows from the rate and manner of compensating the judges for their services. By the thirteenth section of the Act of the 3d March, 1830, the Chief Justice was paid annually out of the Patent Fund, in consideration of the duties therein imposed, the sum of $100. But this section was repealed by the Act of 1852, and the Commissioner of Patents was required to pay to the Chief Justice or Assistant Judges, according as the appeal might be taken to either, the sum of twenty-five dollars, required to be paid by the appellant into the Patent Office by the eleventh section of the Act of the 3d March, 1839.

The reason of this enactment it is now difficult to discover; but the evils resulting from it must, I think, be apparent to every reflecting mind, and are very forcibly stated by the Hon. Secretary of the Interior, in his annual report to the President of the United States for 1857:

"The appellant not only selects the judge who shall try the case, but also pays the fee of twenty-five dollars allowed him. The amount of compensation thus received will depend upon the number of cases brought before him; that number will inevitably be influenced by his course of decision. The judge is thus placed in a position of embarrassment, if not of humiliation, alike to be deplored by himself and the country."

There is still another point in which the Act allowing appeals imperiously calls for amendment. The eleventh section of the Act of March 3, 1839, requires the Commissioner to "lay before the said judge all the original papers and evidence in the case, together with the grounds of his decision fully set forth in writing, touching all the points involved by the reasons of appeal to which the revision shall be confined." This "evidence" most commonly consists of the *records* of the Office, the drawings, specifications, and models of patented and rejected applications, which are needed always in the Office for the transaction of its current business, and yet this law requires that with every appeal, the Commissioner shall transmit to the selected judge that portion of the records appertaining thereto, which, as proceedings are at chambers, means to the residence of the judge. In the meantime, these records are withdrawn from public inspection, and instances have occurred in which applications for patents have been suspended for months, in consequence of the danger of acting upon them in the absence of a portion of the records relating thereto.

Such are the evils incident to the laws of appeal, as they now exist. There is no difficulty in the way of their amendment, and, in my opinion, no time should be lost in applying the proper remedies. Why could not appeals from the adverse decision of the Commis-

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sioner of Patents be taken to the Circuit Court of the District of Columbia, instead of to the individual judges? Why should not each judge for the duties thus imposed be allowed an annual compensation of, say $500, and when a patent cause should be heard, why not require the Circuit Court to sit in the Patent Office, in a room to be provided for that purpose? I confess I can see no objection to an amendment of this nature and respectfully recommend that such a law be enacted. It would obviate all the defects above explained, and, it is confidently believed, would meet with the approbation of the judges.

Previous to the month of December, 1857, it was the practice of the Commissioner to hear appeals in person from the adverse action of the examiners; but it was soon found, from the natural increase of the business of the Office, that this was becoming a physical impossibility; and hence was adopted the alternative of deputing temporary Boards of Examiners, which, in some measure, relieved the Commissioner of the burden thrown upon him. But the plan soon developed its own imperfections. Each Board had its own principle of action, and, in many instances, this differed from the rules prescribed by the Commissioner. As a corrective, it was at length determined by Commissioner Holt to establish a permanent Board of Appeal within the Office, whose members, three in number, should be taken from the Examining Corps, and whose duty it should be to examine all *ex parte* rejected cases, and submit their report and recommendation, as to their final disposal, to the Commissioner for his approval. This Board has now been in existence for over three years, and the wisdom of its creation is a matter placed beyond all doubt. Guided in its principles of action by the doctrines established by the Courts, and illustrated by such eminent Commissioners as Mason, Holt, Bishop, and Thomas, whose confidence it has always enjoyed, "the result of its action," as stated by Mr. Holt in his report for 1858, continues to be "eminently satisfactory," and "to command, it is believed, the entire confidence of the country."

Since its establishment, the Board of Appeals has revised 1,790 cases, 748 of which it has reported for final rejection, while 271 have received its partial action. Of those rejected, only 42 have been carried up on appeal to the Judges of the Circuit Court of the District. It is confidently believed that no other tribunal of a like nature can exhibit such evidence of public approbation.

Prior to the 1st July, 1860, interferences were declared, examined, and the result reported to the Commissioner, by the separate Examiners to whose class they belonged. While the business of the Office was comparatively light, and the number of Examiners few, there was not much objection to this course; but as the number of applications and examiners increased —the former, however, in a greatly augmented ratio io the latter—it was found to be impossible for the Examiners to attend to their current duties in an intelligent manner when they were subject continually to be called off, to devote, in many instances, a week at a time, to the hearing and determination of questions arising between contesting applicants. But this, perhaps, was not the greatest evil. The Examiners had increased in the course of a few years from two in number to twelve; and as each Examiner disposed of his own interferences, there were as many different sets of rules and principles established as there were differently constituted minds. The want of harmony, the confusion, in short, resulting from such a state of things, was a source of great complaint, and involved the Office practice in a mist so impenetrable that the most acute became discouraged in their search for a clear and well-defined guide to the path they sought. A remedy seemed to be imperative; and as the only resource within his power, Commissioner Thomas deputed one of the most practiced and competent Examiners to discharge this duty, whose action, characterized by great industry and ability, it is believed, has given eminent satisfaction.

I would suggest that Congress make the designation permanent with reference to this particular service, giving the sanction of positive enactment to a rule eminently successful, if not imperatively required, in the future conduct of the business of the Office.

S. T. SHUGERT,
Acting Commissioner of Patents.

HON. JOHN C. BRECKINRIDGE,
Vice President of the United States.

ANILINE DYES.

Those beautiful aniline colors on silk and velvet, varying in tone from a crimson to a delicate lilac, and which have been known by the flash names of solferino, magenta, mauve, roseine, violine, purpurine, &c., are the products of an alcohol solution of an organic alkali combined with mineral oxyds. This alkali is aniline, a peculiar substance principally derived from coal tar, but it can also be manufactured from indigo. The production of these colors involves some of the most subtle and intricate processes known in chemistry; a more simple and connected explanation of some of them than has yet been given to the public will therefore be of very general interest.

Organic substances are exceedingly puzzling to chemists, on account of the great variety of products obtained from one general substance, such as bituminous coal. When this is distilled in a retort, one of its products is tar, from which, by distillation and rectification, the following are derived, the first three columns being liquids :—

NEUTRAL.	ACIDS.	BASES.
Water.	Rosolic.	Ammonia.
Benzole.	Brunolic.	Methylarnine.
Toluol.	Phenic.	Ethalymine.
Cumole.	Acetic.	Aniline.
Cymole.	Butyric.	Quinoline.
Propyle.		Picoline.
Butyle.		Toluidine.
Amyle.		Cumidine.
Caproyle.		Phyrrhol.
Hexyline.		Pætinine.
Heptyline.		
Oil of tar		

GASEOUS PRODUCTS.	SOLID PRODUCTS.
Hydrogen.	Carbon.
Carbureted Hydrogen.	Naphthaline.
Bicurbureted Hydrogen.	Paranaphthaline, or Anthraceine.
Various Hydro-carbides.	Paraffine.
Carbonic Oxyd.	Chrysene.
Sulphide of Carbon.	Pyrene.
Carbonic Acid.	
Hydro-sulphuric Acid.	
Hydro-cyanic Acid.	

Here are no less than forty-two different products obtained from coal. Some of these have truly jaw-breaking names, and some of them emit the most horrible stench; while others, such as benzole, afford a very pleasant odor. Different coals yield varying quantities of these products in their tar: some contain little benzole and considerable naphthaline, while others contain a preponderating quantity of benzole and phenic acid.

Aniline can be obtained by treating the tar of coal with acids and alkalies, and then distilling it with milk of lime; but the most simple method to obtain it is to operate with benzole, because it is now a common article of commerce. Benzole is a peculiar hydrocarbon fluid, which is employed in some instances for illumination, and for cleansing soiled silk and light colored kid gloves. It dissolves gutta-percha, has an agreeable odor, and, when inhaled, produces intoxication. To make aniline from benzole, the latter is treated with aquafortis, as follows :—

A certain quantity of nitric acid is placed in a capacious glass vessel surrounded by cold water, and about an equal quantity of cold water is added to it, until two layers of the liquid begin to appear. The glass vessel is then removed from the cold water, and slightly heated, until the two layers of liquid have united; the whole is now thrown into six times its bulk of cold water, when a heavy yellow oil sinks to the bottom. This is nitro-benzole, which is afterward repeatedly washed with water for use. It possesses an agreeable odor, and may be used as a perfume. By saturating a solution of nitro-benzole and alcohol with ammonia, then passing a current of sulphureted hydrogen gas through it, a deposit of sulphur falls to the bottom, and aniline is the other product. Another method of obtaining it is by treating nitro-benzole with nascent hydrogen. Being an alkali, aniline combines with acids, forming salts, and also with various oxyds, forming quite a variety of compounds.

A great number of patents have been taken out in England and France for dyeing aniline colors. The first on the list is that of Mr. W. H. Perkins, of London, which was obtained in August, 1856, and was for the celebrated *mauve*—a deep violet. He took a cold solution of the sulphate of aniline (aniline combined with sulphuric acid), and a similar solution of the bichromate of potash, and mixed them thoroughly together; then allowed it to rest for twelve hours. A black deposit fell to the bottom of the vessel; this was washed with water, then dried, and afterward digested with benzole, which dissolved out all the tarry matter contained in it. It is thus described in Perkin's patent, which shows that he used very impure aniline, because if he had commenced to obtain it with pure benzole, it would not have been combined with tarry matter. The chromate of aniline thus made is a rich claret color, but is insoluble in water. To render it fit for dyeing silks, &c., it is dissolved in alcohol or wood spirit; and in this condition, it is now sold to dyers.

The French method of treating aniline to obtain a red color (solferino), is the invention of M. Verguin, a chemist of Lyons, who sold his discovery to M. Renard Freres, who took out a patent in 1859, and gave the color the name of "Fuchsiacine." It is made by mixing ten parts (by weight) of aniline with six of anhydrous chloride of tin, then boiling them for fifteen minutes. The mixture first becomes yellow—then assumes a beautiful red. Considerable water is now added to the solution; then it is boiled for a little while longer, and filtered while hot. The filtered liquor contains the coloring matter in solution. When common salt is added to this solution, the color is deposited; and it may then be separated by decantation, dried, and sold in powder. In this condition it is insoluble in water, and requires to be dissolved in alcohol for common use in silk dyeing. It is sold in both conditions, but most commonly as an acoholic liquor.

A red color can be obtained with aniline and several anhydrous chlorides—such as bichloride of mercury, perchloride of copper and perchloride of iron; also, the hydrate of bichloride of tin, bibromide of tin, iodide of tin, and a host of other "ides" and "ates." By the employment of acid and alkalies as alteratives to produce reactions in the dyeing liquors, almost any shade or color can be produced with aniline solutions, from a crimson to a deep lavender approaching a blue. We have examined ten English patents granted for making aniline colors, and find that most of them have a very close relationship to the first that were issued to Perkins and Renard Freres.

The colors derived from aniline are exceedingly brilliant in hue, and they withstand washing very well; but after having been thoroughly tested, they have failed in one particular feature demanded of all colors exposed to light, viz., they fade when exposed to the beams of the sun. This is one essential point to which the attention of color chemists should be directed in order to discover some oxyds which, when combined with aniline, will not be changed by solar light.

The colors hitherto manufactured from aniline have been chiefly of one class—crimson and purple. But why may not other colors—such as green, blue, brown, &c.—be also obtained from aniline? And cannot the analogues of aniline in the above table be also employed in the manufacture of new coloring compounds? A beginning has just been made by the distinguished English chemist, F. C. Calvert, in this line. He has recently, conjointly with two associates, taken out a patent for an aniline green color, called "emeraldine," which is said to be exceedingly beautiful. We have no doubt but brilliant coloring matters may be obtained from the bases cumidine, toluidine, &c., &c., as well as aniline.

We have given a simple and brief description of the peculiar products of bituminous coal, and how aniline and its beautiful colors are manufactured. These substances are very high in price at present, which affords us good grounds for concluding that there is plenty of room for improvement in the processes now employed to obtain them. The coal fields of America embrace an area of 180,000 square miles; they contain inexhaustible stores of these coloring materials, and there is nothing in the whole range of chemical science opposed to the reasonableness of the conclusion that every color known in the arts may yet be manufactured from the products of coal—yes, and from the very refuse of our gas and coal oil manufactories.

CONDITION OF THE PATENT BILL.—At the time of our going to press, the Senate and House had voted to disagree to sundry amendments made by each, to the Patent bill, and a conference had been agreed upon between the two branches, so that it is probable some compromise may be agreed upon, and thus the bill may be saved. It will afford us much pleasure, if, in our next issue, we can congratulate our readers upon amendments of the patent laws, such as we have been contending for for years past.

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Our Correspondence.

The Aquarium.

Messrs. Editors :—In a former letter, on this subject, on page 71 of the present volume of the Scientific American, the fish spoken of are, of course, not limited to the number or kind therein set forth; but the balance between the animal and the vegetable life may soon be found by experience. Now, reader, let me go with you to some little brook or pond in search of stock for the tank. Having first made a nice little scoop net out of some fine gauze, and having one or two tin pails, we start. Here we come to some little brook, so small indeed and secluded, that we scarcely have any intimation that we are at it, except by the gentle hum of the water, as it dances along on its way to more stately, but not more picturesque streams. Now, let us sit down and keep our eyes as wide open as possible (for fear we may not see enough); and what is that queer-looking animal going down the brook, too lazy to walk, and so lets the current carry him down, and having in his possession two large claws almost (one would think) larger than his body? Why, that is the crayfish, more generally known by boys as the crab. We shall want one or two of them, so we very carefully put our net down behind him, and touch him with a little stick. In he goes, and you have him. Now, put him in the pail with a little water. But there goes something! sure enough what can that little fish be that was going so very swift, and in an instant stopped in the weeds by the bank? Now, run the net against the current, and along these weeds, and, if it is in there, it will be ours. Here we go. Yes, it has gone. No! up with it, and very gently let it drop into the pail; but what is it? It is a darter, so called from the quick and abrupt motion with which it moves, and a very pretty little fish it is; it never grows more than two or three inches long, and is one of the best fish for a tank. And there is another; with a little care, and we shall have it. What kind of a fish is it? See how he stops and moves his delicate little fins in the water, and how its sides reflect the golden sunlight! and then can any one say it is not beautiful. Here, we have him, and it is one of those world-renowned stickle backs, so called from the four or five little horny spires which appear on its back, which it can eleyate or depress at its pleasure, and one of the greatest curiosities in the aquarium.

Now, let us go to some still pond and see if we can find a few snails. There they are—some with round, others with spiral shells. Let us take five or six of each kind, and put them in with the fish. Next look about for some tadpoles and polliwogs, which are known to almost every one. We may take two or three of these, and now we have enough. Let us start for home, and introduce our new companions to their small, but nice home.

First, we put in the crayfish, and if there is any rock work, he will be sure to get under it, even if he has to dig away the gravel in order to accomplish it. Next we may put in the tadpoles and polliwogs. They will wriggle along until they come to some piece of water weed, and then rest for a few moments. We will then introduce the snails, and shortly they will be seen to crawl partly out of their shells, and move up the glass, and around the plants, eating the decaying and surplus vegetation and animal matter, and thus becoming one of the most useful as well as interesting tenants of the tank. Last of all we introduce the fish, and there is not a nook or crevice, of any sort in any part of the aquarium, which will escape their notice. At first they swim against the glass sides of the tank, not being accustomed to it, but they soon learn how far their dominions extend, and learn to be content.

In another letter we will describe the conduct and habits of the little denizens. T. D. A.

Rochester, N. Y., Jan. 25, 1861.

Boiler Grate-bars.

Messrs. Editors :—I noticed in a late number of the Scientific American (page 23), an article on the subject of boiler grate-bars, taken from "King's Practical Engineering." The author is right about the play required for grate-bars, but I think any difficulty on this point may be effectually overcome by cutting off the upper corner of each grate-bar, leaving the end sharp, so as to leave no room for ashes, &c., to get in. The way to do this, however, is to cut off the pattern before the bars are cast; this will save the pushing out of fire fronts, the bending of grate-bars, &c. It should be cast at an angle of about forty-five degrees.

C. B.

Des Moines, Iowa, Feb. 13, 1861.

Cotton Grown in New Jersey.

Messrs. Editors :—I send you a sample of cotton raised (out-door) in New Jersey, at Camden, on the Delaware, opposite this city. The seed from which it grew is the second growth planted at that place, in May last, by Mr. Henry Minton. He considers the yield a good one, considering the locality, the ground being low and wet. From about 35 plants he gathered about 10 lbs. of cotton, as per sample. His success, on a small scale, has induced a party to join him and try the experiment upon a larger one, and upon land better located; and they intend to plant three acres with cotton seed next spring; and, if it *pays*, Mr. Minton will have opened a new page in the agricultural history of New Jersey.

Thinking this a fact worth knowing, I forward it to you. U. B. V.

Philadelphia, Pa., Feb. 20, 1861.

[The sample sent us is very excellent short staple cotton.—Eds.]

A Good Word.

Messrs. Editors :—The patent granted to me a short time since for an improved clothes wringer, which was once rejected but finally obtained through your agency, is proving to be a first rate thing. We are unable as yet to supply the demand for the machines which is increasing ever day, as they are seen and tried; and we find the *right* sells very readily. We have already received thousands of dollars for rights, and have not been away from home at all to try to sell it, and are having new customers every day. We appreciate the assistance you have rendered us in this case, and should we ever need such help again, shall know where to apply. Geo. J. Colby.

Waterbury, Vt., Feb. 16, 1861.

The Gold Fields of Australia.—There are some facts (says an exchange paper), given in the Registrar General's published statistical notes respecting the yield of gold, which have a very close and intricate bearing upon the present state of the labor question in the colony. From 1851 to 1859 inclusive, the gross product of the gold fields of Victoria are set down at $435,225,000, and the annual returns show that while the yield has undergone a gradual diminution since 1856, there has been an increase in the number of persons engaged in mining pursuits, and in the number of quartz-crushing machines and steam-engines employed in extracting the precious metal, or in facilitating the operations of the miner. In March, 1857, there were 62,211 mechanical appliances employed, consisting of 359 quartz-crushing machines and steam engines, 3,540 puddling machines, and 370 whims. In December, 1859, the number of miners had risen to 100,591, of whom 15,342 were at work upon quartz reefs, and the machinery employed was thus classified :—301 quartz-crushing machines; 296 engines, whose aggregate horse power was 4,375½; 3,982 puddling machines, and 465 whims, of the total value of $5,779,615. The estimated value of the gold produced last year was $45,613,510; and deducting from this amount $1,155,920, representing ten per cent interest upon the capital invested in machinery, and ten per cent for its deterioration, it will give a net residue of $44,457,640, divisible among 100,591 miners, yielding to each individual an income of not more than $8 per week.

In some of the furnace-heated houses in this city, the air becomes so dry that it is a common amusement of the children to light the gas by a spark of electricity from their fingers. By rubbing the feet along the carpet the body becomes so charged with the electric fluid, that, on approaching the finger to the gas-burner, a spark is drawn forth sufficient to light the gas.

The Wealth of Boston.—The population of Boston, Mass., by the census of 1860, is 177,902, and the valuation of the property $311,978,663; this gives $1,754 to each inhabitant, being about $7,000 to a family.

Column of Varieties.

It has been estimated that there are five millions of horses in the United States.

The wheat raised in 1860 averages about three lbs. in weight per bushel more than the crop of 1859.

The British iron-clad frigates *Warrior* and *Black Prince* are to be fitted with powerful double engines, the cylinders of which will be 112 inches in diameter.

There are 1,102 newspapers and 481 magazines now published in Great Britain. Nearly one half of the latter are of a religious character.

There are at present no less that 3,343,000 bushels of grain at the two New York lake ports of Oswego and Buffalo.

The cubic contents of St. Paul's Cathedral in London are 5,000,000 feet. This is heated by 13 hot air stoves and an average temperature of 58° Fah., maintained during every day of winter.

A mail train recently ran between London and Rugby, a distance of eighty-three miles without stopping. The London *Engineer* states that this is believed to be the longest continuous journey ever made upon any railway.

Glycerine is now employed to float compasses on board of several of the Atlantic screw steamers. It is but little affected by heat or cold, and is well adapted to withstand atmospheric changes.

Steam is employed for heating carriages on the Lyons railway in France. It is conducted by pipes from the locomotive to all the cars. The joints are flexible, being made of vulcanized india-rubber.

A correspondent of the *Shoe and Leather Reporter* states that he has made careful experiments in tanning hides, and has found that 53 lbs. of tannin can be made to combine with 47 lbs. of well-cleaned raw hide.

Mr. Titus Salt, an English manufacturer, uses 3,000,000 lbs. of alpaca wool annually, besides a great deal of cotton which is mixed with the wool, to form warps for what are called "alpaca fabrics."

The *Ohio Farmer* advises wool-growers not to wash their sheep, but to shear the wool without being washed, and sell it in that condition. Manufacturers prefer unwashed wool, because much of that which is washed on the animal is injured by the operation.

The speed of boys' sleds going "down hill" sometimes far exceeds that of the fastest locomotive. A gentleman at Middletown, Conn., lately timed some boys "coasting" down one of the steep streets in that place, when he found that they went down at the rate of two miles per minute or 120 miles per hour.

The first observatory erected in America was in Philadelphia, in November, 1763, by a carpenter, who was employed by Mason & Dixon, when these mathematicians were employed to define the line which still bears their name. This observatory was erected for the purpose of ascertaining the southermost point of the city of Philadelphia.

An English writer in *Blackwood's Magazine* on iron-clad ships of war, says to the British government:—"Call in the mechanical and engineering skill of Great Britain and America openly in the face of all nations, and let others match us if they can."

On the 23d of January last, a trial trip took place on the Thames, near London, of a peculiarly constructed steamer, intended for the conveyance of troops upon the Lower Indus. She is 377 feet long, and has accommodation for 800 men and their officers, while the draught of water was only two feet.

Of the Chinese emperor, every one, even those of his own chamber, stands in the greatest imaginable awe, and on no pretext does any one address him save with the use of all his grand and glorious titles. It is the etiquette in the Chinese court for the emperor's physician to apply the same titles to his diseases as to himself, and accordingly they talk of "His high and mighty stomachache," "His imperial and godlike dyspepsia," and "His eternal and never ending diptheria."

The western coast of North America is so much warmer in the winter than the eastern coast, that a winter climate no colder than that of New York city extends as far north as 65 degrees, corresponding in latitude with the middle of Hudson's Bay and the almost uninhabitable regions of Labrador. The valley of the Saskatchawan, in latitude 52°, 1,000 miles northwest of Lake Superior, is very fertile, and wild cattle live through the winter upon the abundant grasses which it produces.

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Improved Mole or Drain Plow.

The extreme simplicity of the mole plow would seem to preclude the possibility of its being the subject of a large number of patents; but experience in its use points out several modifications, and the great importance of the implement renders all these which are of any consequence well worth patenting. We continue our illustrated history of these modifications by an engraving of the plow as designed by Martin A. Howell, Jr., of Ottawa, Ill. The improvements embraced in this invention are two-fold: 1st, a rasp or saw is introduced for cutting off any roots that may be encountered; and 2d, a joint is made in the mole to enable corners to be turned with a curve, thus forming a drain through which water will flow more readily than through drains with square corners.

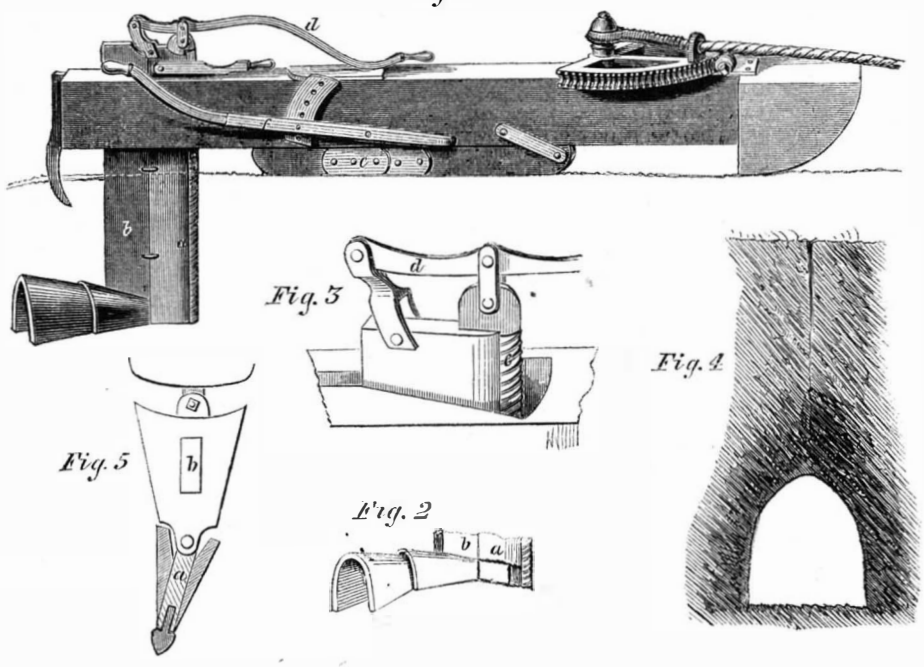
The inventor says:—"There are thousands of acres of swamp land lying idle which require a cheap mode of draining, the ordinary mode being too expensive. In timber growing countries the difficulty and expense of opening a drain through ground filled with stumps and roots, which do not rot in very wet ground, has caused many desirable tracts to be left untouched and worthless. Now, by underdraining these lands, the air reaches the roots and they soon rot out, when they can be removed. Many such tracts lie in old settled districts where the adjoining land is extremely valuable."

In the annexed engraving Fig. 1 is a view of the whole plow, and the other figures are representations of the several parts, Fig. 4 being a view of the drain. The two coulters, *a* and *b*, Figs. 1, 2 and 5, are connected by hinged joints as shown, and the mole is also jointed as represented in Fig. 2. For turning a corner the forward coulter is, by means of a lever or screw, inclined at a proper angle for sweeping the desired curve, when the rear coulter and jointed mole follow in its track; the large rear part of the mole compressing the earth, closing the coulter slit and finishing the drain in the most perfect manner, as represented in Fig. 4. The rasp, *c*, Figs. 1 and 3, for cutting off any roots that may be met with, is secured directly in front of the forward coulter in such a manner that it may be worked up and down by means of the lever, *d*. As the plow, drawn by a windlass, moves very slowly when a root is encountered, it may be cut off while the plow is drawn along, by moving the rasp, *c*, vertically up and down by means of the lever, *d*. The shoe, *e*, is to regulate the depth of the mole, it being adjustable by means of the lever, *f*.

The inventor says:—"The demand for work to be done by this machine in our best dry prairies and low wet lands, is such that it will require many machines in this county alone to fill the orders from those mostly who tested its operation last year."

The patent for this invention, which promises to be a money-making one, was reissued Feb. 19, 1861, and further information in relation to it may be obtained by addressing the inventor, M. A. Howell, Jr., at Ottawa, Ill.

Fig. 1



HOWELL'S IMPROVED MOLE OR DRAIN PLOW.

Improved Cork-Cutting Machine.

We know of no department of invention in which more money has been expended with less success than in cork-cutting machinery, and at last the long sought end is attained by a plan so simple that the wonder is that it was not thought of at the very beginning. Mr. Alexander Millar, of this city, has invented a cork-cutting machine, which is now in operation in the depot building of the Harlem Railroad, corner of Franklin and Elm streets, in this city, where, as we know from actual inspection, it is working in the most successful manner, turning out corks of all sizes from large bottle corks down to those suitable for homeopathic vials, and of the best quality.

Fig. 1

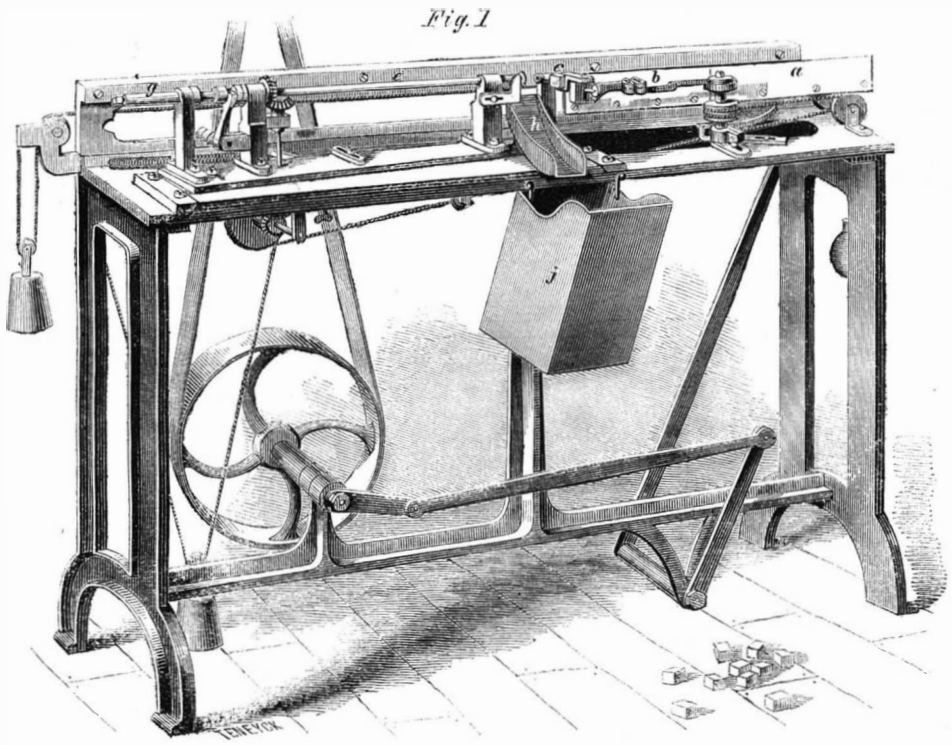
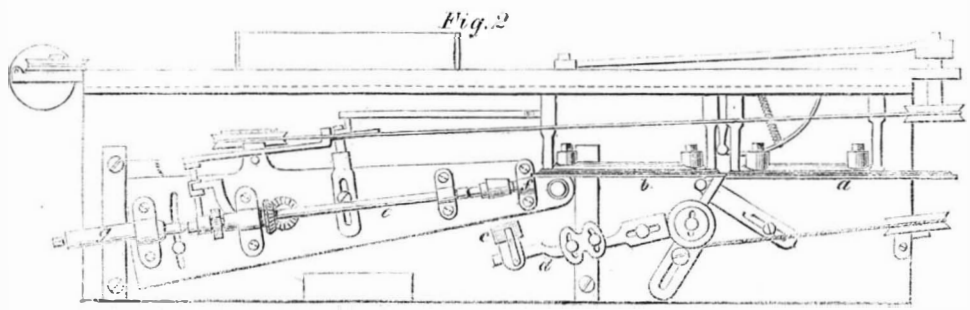


Fig. 2



MILLAR'S IMPROVED CORK-CUTTING MACHINE.

The machine is represented in the annexed engravings, of which Fig. 1 is a perspective view, and Fig. 2 a horizontal view from above. It consists essentially of a turning lathe in which the cutting tool is a long knife with a thin edge set at a slight angle with the axis of the cork, to give the taper to the cork, and sliding along as the cork revolves, so as to make a drawing cut. The knife is made in two parts, or rather there are two knives, *a* and *b*, Figs. 1 and 2, the knife, *b*, which comes first against the block to be cut, being a very little nearer to the block than the second knife, *a*, by which arrangement the corners of the block are cut off at its first revolution, and the turning down is completed at the second revolution. The square block of cork, *c*, to be cut is fed by hand into the swinging clasp, *d*, which, by an automatic movement, carries it forward between the serrated ends of the spindles, *e* and *f*. The spindle, *e*, has a sliding motion in its bearings, and it is drawn back by the mechanism to receive the block, and when the block is placed the spindle is released, when it is immediately pressed forward toward the spindle, *f*, grasping the block between the serrated ends of the two spindles. The swinging clasp, *d*, is now drawn back, the spindles commence their slow rotation, and the knives are drawn along, bringing the edge of the knife, *b*, first against the block and taking off its corners, after which the nearer knife, *a*, follows in a line a little nearer to the axis of the cork and finishes the operation.

The several motions are effected by well known mechanical devices, the most simple being invariably adopted. The pressure of the spindle, *e*, against the cork is produced by a spiral spring enclosed in the cylinder, *g*, which forces a steel pin against the end of the spindle; the pressure is regulated by turning a screw in the end of the cylinder which bears against the spring. The knives are also adjustable in their position. When the cork is finished, the spindle, *e*, is drawn back automatically, releasing the cork, which falls down the inclined trough, *h*, into the receptacle, *j*.

Patents for this ingenious and valuable invention have been secured through the Scientific American Patent Agency both in Europe and the United States, the American patent bearing date Jan. 29, 1861, and further information in relation to the matter may be had by addressing the inventor, Alexander Millar, corner of Franklin and Elm streets, New York.

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VOL. IV. NO. 10....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, MARCH 9, 1861.

THE NEW PRESIDENT AND THE COMMISSIONER OF PATENTS.

The President elect has recently passed through this city, on his way to Washington, to assume the duties of Chief Magistrate; but, while he has been warmly welcomed everywhere by thousands of people, if we take the concurrent testimony of the daily press, a crowd of hungry office-seekers have followed the Presidential train, the number increasing at every point of arrival and departure, doubtless much to the annoyance of the "coming man." Even the legislative and executive authorities of this State got into a petty squabble as to which should do the honors at the State Capital, one facetious Senator, looking on and enjoying the fun, having moved to telegraph the President elect to switch off at Schenectady, and proceed *direct* to New York by the way of Troy. All the way down to the Federal Capital the expectants pushed on, and are now waiting under the eaves of the Presidential mansion, in breathless suspense, for the working of the political machine.

These free demonstrations are entirely in consonance with our ideas of enlarged freedom. All native-born citizens being eligible to the highest office in the gift of the people, and few unwilling to accept it, or almost any other on the sliding scale; patriotism to serve the State thus becomes a business commodity, which drought and rains cannot affect. It is supposed that no office has less than one hundred applicants, while for some a State or city directory might be *filed in* with a list of patriots to be selected from at random. We understand that there are half a hundred aspirants for the office of Commissioner of Patents, fifty of whom we hope to see doomed to disappointment. This matter is not to be left to the free choice of the President, to whose judgment we would gladly defer, but that special engineering is to be resorted to, in order to fill the office with a Simon Pure politician, one who will be true to all the blinding behests of party.

Our readers will bear witness that we have earnestly contended against debasing the Patent Office into a political cesspool, to be groveled in by a mess of loafers, such as hang about Custom Houses and other hot beds of political corruption. The Patent Office has gradually become demoralized, and is losing that dignified position which it enjoyed even but a short time ago, some of its attaches being unfitted, either mentally or morally, to fill the places they now occupy; and inventors have become, in some degree, disgusted with the whole concern. Who is qualified to assume the important office of renovating this great national repository of genius, and administering its legal and scientific details? who shall succeed Judge Mason and Joseph Holt in this important office? are questions that concern every citizen. Shall he be a Congressional lobbyist? Shall he be a broken down politician, without wit, wisdom or reliability? Or shall he be a man against whom the breath of suspicion cannot be raised? It is well understood that no man can administer the duties of that office acceptably, without proper legal qualifications. He may have all the scientific knowledge of Solomon Gills, be able to make a clock, take down the north star and weigh it, solve all the difficult problems in Euclid, operate for cataract on the eye, stuff patients with gamboge, bleed, blister and bolus—he may even have been a member of Congress—served in patent committees and tried his hand in vain attempts to patch up the patent system, and yet utterly fail to make an acceptable Commmissioner of Patents.

For our part (and we utter the views of thousands), the office can best be filled by the appointment of some one who has had little or no experience in the corrupting influence of Washington life—a new man—who can grasp the details of the office, and administer its duties without fear or favor. Such a man can succeed, and gain the approbation of all. But if certain aspirants who are struggling for the office succeed in imposing themselves upon Mr. Lincoln, he will have occasion to regret his unwise choice, as such an appointment will surely degrade the office, and disappoint the just expectations of the people.

We referred, a few weeks ago, to the fact that Hon. Butler G. Noble, of Wisconsin, had been suggested as the person most likely to be appointed to the office of Commissioner of Patents. That his appointment would give general satisfaction, we have no doubt; but what his views of the matter are we do not know, as we never exchanged a word with Mr. Noble, either directly or indirectly, upon this subject, nor do we intend to. Some of his friends are urging his appointment on the ground of fitness, a question upon which there is but one opinion among those who know him. We wish very distinctly to be understood that we have no candidate for this office, and are prepared to support any man who is able and reliable. We think the selection should be made of some Western or Southern man, who is above all suspicion of complicity with patent schemes. We have no favors to ask, and shall expect none, from whoever is appointed, and shall support or oppose him according to his official acts. There are very many inventors who would rejoice to see Judge Mason returned to the office; but political considerations would overrule this. A few patent agents and their political friends are at work trying to secure the office for Hon. C. C. Chaffee, an ex-member of the House, and now Librarian of Congress. Dr. Chaffee is a very clever and deserving gentleman, and would make a polite and accessible Commissioner; but he is now enjoying a good office, for which he is well qualified, and this renders his appointment improbable. Dr. Chaffee, while in the House, was a member of the Patent Committee; but this Committee did nothing to benefit either inventors or the Patent Office, and his appointment therefore would not give satisfaction. Thaddeus Hyatt at one time had his eye on the office, but the wants of Kansas have called him off. Not to name others, we would state that the most formidable candidate, and the man most likely to succeed, is the Hon. Thomas C. Theaker, of Ohio. He has a host of friends, who are working for his appointment, knowing him to be not only free from all objection, but well qualified for the position. We have no personal acquaintance with Mr. Theaker, but letters to us, from reliable and influential sources, speak of him in the very highest terms. Such a man is wanted to fill this important position, and such a man only can succeed. We believe, from all we can learn about Mr. Theaker, that he would make a popular and able Commissioner—one who can be trusted.

BREECH-LOADING CANNON.

Both of the great military powers—France and England—after a long series of experiments by the ablest engineers of each country, have adopted rifled cannon for their armies and navies; but the two governments have come to opposite conclusions in regard to breech-loading cannon. Louis Napoleon's extensive experiments satisfied him that it is best to load heavy guns at the muzzle, while the government of England is expending an immense amount of money in providing the army with the Armstrong gun, which is loaded at the breech.

The disadvantages of breech-loading cannon are very manifest. The greatest and most palpable of these is their complicated structure. In an implement which is subjected to the rough usage unavoidable in the transportation and handling of field artillery, simplicity of structure is of prime importance. An ordinary cannon consists of one single piece of metal with no joints or movable parts, while the Armstrong gun is made up of a number of pieces, and at least one of the parts has to be so nicely fitted to the others that it is necessary to carry a file into the field in order to repair it after every two or three discharges.

Besides this great objection to breech-loading cannon, arising from their complicated structure, rendering some of the joints or parts liable to become impaired by smoke or wear or rust, there is another very manifest one that has certainly not been overcome in the Armstrong gun. In large guns the explosive force of the powder re-acts against the breech with such tremendous power that it seems impossible to make any arrangement of iron or steel that will resist it, except the single one of welding or casting the metal into a a solid mass. We have seen accounts of several series of experiments with the Armstrong gun, and in a considerable number of them some part of the breech was blown away.

We have read many columns and pages of discussions on the subject in the London papers in the endeavor to learn what the advantages are which compensate for these great and manifest disadvantages. It has been distinctly stated that an Armstrong gun cannot be loaded as quickly as a muzzle-loader. We have seen no contradiction of this statement, but if it has not been contradicted it is almost the only assertion in connection with the whole subject that has been suffered to pass undisputed. In truth, the treatment of this matter has not been creditable to the English press; we have had descriptions and engraving of the gun which were publicly pronounced by Sir William Armstrong himself to be entirely erroneous; and if the publishers of the London *Engineer* would now send an artist to make a sketch of this famous weapon as it actually appears, and would accompany the engraving with an intelligible description which they could warrant to be correct, they would convey an interesting piece of intelligence to their readers.

In one respect there is no doubt of the great excellence of the Armstrong gun—the wonderful accuracy with which it carries. We recently re-published the statement from an English paper that, at a late trial, a target one foot square, at a distance of more than half a mile, was hit at every shot! Whether this precision results from anything connected with the breech-loading we are not informed, and if it does, it is doubtful whether it would give any greater efficiency in the field than the degree of precision which is obtained with the French muzzle-loaders.

The experiments by the officers of our own army have established a general, if not universal opinion in favor of rifled cannon; but we think that Congress should at least wait for further developments before adopting any breech-loading device yet suggested.

THE REPORT OF THE COMMISSIONER OF PATENTS.

Our readers will not fail to peruse the brief report of the Acting Commissioner of Patents, Mr. Shugert. It is a modest and business-like document, and the statistics, which are very suggestive, represent the condition of the Patent Office in a favorable light.

The number of applications for patents, it will be seen, have increased in a healthy ratio since 1837, as during that year only 435 patents were granted. During the year 1859, 6,225 applications were made for patents, 4,538 of which were granted. In 1860, the number of applications was 7,635, and the number of patents granted, 4,819. The receipts of the office during the year amounted to $256,352.50; expenditures, $252,820.80. There is now to the credit of the Patent fund $89,437.41, thus showing that the Patent Office is not only a self-sustaining, but an independent office, asking no other favor of the government than the appointment of honest and faithful men to manage its affairs. No stronger argument can possibly be adduced in favor of a speedy reduction in the amount of fees required of the applicant for a patent, and instead of 38 applications for patents from foreign countries the number would be increased ten fold. Reference is made to the eminently satisfactory manner in which cases of interference have been decided; but not one solitary crumb of comfort is thrown out to Commissioner Thomas' monolith of folly, the Revisionary Board. Why was not some sop thrown out to this modern Cerberus, which has kept such close guard over the subordinate examiners?

We suppose this ridiculous farce must go on, at least until a new Commissioner is appointed, when some much-needed reformation will be required, or the public will not rest satisfied.

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Molded Cast Steel Plows.

Owing to the peculiar adhesive nature of the soil on our western prairies, steel plows polished as bright as mirrors, are generally used for plowing. Hitherto all the steel plows made for the west have been formed of rolled sheet steel of uniform thickness, the different parts being cut out of the sheets, then forged and fitted together. Such steel did not provide for the unequal wear of different parts of plows, and as a consequence some of the parts, such as the heel of the landside, the sole of the point, and the underside of the moldboard would be worn out, while the other parts were nearly as good as when first made. An important improvement was patented by F. F. Smith, on the 20th of November last, which will, in our opinion, revolutionize the entire manufacture of steel plows for the west. This improvement consists in forming the sections of such plows of molded cast steel, the parts being so cast as to have the greatest thickness of metal where the plow is exposed to the greatest wear. A much greater amount of steel is therefore cast in the exposed part of the point, the landside, and the moldboard thus rendering such plows not only much more durable, but much stronger. As each section of such a plow is cast alike, farmers can keep duplicates on hand, and replace them without employing a blacksmith, which cannot be done with forged plows.

As the castings of these plows are made by pouring steel into iron molds, the surface of the metal becomes much harder and wears longer than common hardened steel. Each plow is adjustable for either two or three horses, and Western farmers, we believe, will find them deserving of general adoption. They are manufactured by Collins & Co., Collinsville, Ct., where the inventor resides, and specimens may be seen at No. 212 Water street, this city, where we examined them a few days ago.

New Pilot Boat.

The New York pilots are distinguished all the world over for their skill, daring, and enterprise, and their boats have an unrivalled reputation for beauty of model and great speed. They are really yachts so far as model and rig can make them, and a strong feeling of emulation exists among our shipbuilders to construct, and our pilots to own and sail, the best and fastest pilot boats. The New York pilot craft were in fact our first American yachts, as they furnished the original models for the very swiftest of such vessels. The first trip of a new pilot boat, therefore, is an event of considerable interest to our shipbuilders and pilots, and such an occurrence took place on the 11th inst., in the case of the *Wm. H. Aspinwall*, a new pilot yacht of beautiful model, built by Vandeusen Bros., at their yard, foot of Eighteenth-street, E. R. This vessel is schooner-rigged, 100 tuns burden, 75 feet in length, 19 feet 6 inches breadth of beam, and 7 feet 10 inches in depth. Her owners and pilots are Captain Walter Brewer, Gideon Mapes, Wm. H. Anderson, Geo. Burger, and John N. Dale. She made a run out of 26 miles, sailing around the lightship, and returned. The trip was considered highly successful and gratifying to the builders and the pilots in all that relates to superior speed, obedience to the helm in steering, and other qualities which constitute a good sea boat.

Inventors in Seceding States.

Applicants for patents in South Carolina, Georgia, Louisiana and other seceding States, experience a difficulty in executing their papers from not being able to find an officer who will administer the oath of citizenship required of inventors. Many worthy inventors residing in these States have had their papers prepared for the Patent Office, and while some have no compunctions in regard to taking the oath of citizenship, they cannot find a Justice of the Peace in their vicinity to administer it. Others regard themselves citizens of another republic, and write to us that they cannot conscientiously take the prescribed oath.

To the latter class we have no advice to give; but to the class who would take the oath of citizenship could they find an officer to administer it, we would suggest to such that, by stepping into an adjoining State, where the ordnance of secession has not passed, they will have no difficulty in finding a Justice of the Peace, judges, or clerks of some courts, before whom they can execute their papers, which transaction will hold as legal as if they had been executed in the State and county in which the applicant resides.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association was held, at its room in the Cooper Institute, this city, on Thursday evening, Feb. 21, 1861—Professor Mason in the chair.

Mr. JOHNSON proposed the subject of Soluble Quartz for future consideration.

Mr. ENGLEBRIGHT proposed, subsequently, the subject of "Ventilation."

VENTILATION.

Col. RUTTAN, of Canada, presented some of his views of ventilation, and exhibited drawings in illustration. As to the necessity for ventilation, all were agreed upon that. The question was merely as to the *modus operandi*. Perhaps no man living had expended so much time or money in experimenting upon ventilation as he had. He had come to the conclusion that the principles upon which ventilation is usually based are wrong *ab initio*. The common method is to ventilate by mechanical, and not by natural means; and the mechanical means are a departure from nature in this wise, that they are predicated upon the theory that hot air naturally goes upward. That is not the fact. Air has weight; and heating it does not deprive it of its weight. Hot air, therefore, naturally goes downward. It usually goes upward, because we usually allow cold air to force it up. If we provide means for taking the cold air from under it, hot air will fall as certainly as lead. Warming a house by a true ventilating process is the cheapest and most healthful mode. When a man's feet are cold, he is cold all over; and when his feet are warm he is warm all over. The method which he would propose, founded upon the true theory, was substantially this. The floor joists are to be furred off about two inches, so that there shall be a connected stratum of air between the floor and the ceiling below. This air chamber communicates all around the edge of the room with the room, and communicates also with the chimney or ventilating flue. This stratum of air effectually prevents cold feet; for even if it should sink to 40°, the feet being always covered with leather and woolen, the natural heat of the body will prevent them from becoming cold. The air is warmed in the hall, and admitted into the room at the top. It is not necessary that it should feel warm to the hand; for air at 90° will feel cold to the hand, and yet will warm a room sufficiently. The chimney acts as a pump drawing out the cold air first from the space between the floors and then from the lower part of the room, while the warmer air in the upper part of the room falls to take its place, and the heated air rushes in to fill the vacuum in the top of the room. It is not necessary that rooms to be heated should be immediately connected with the hall. He had warmed a room where there were two intervening rooms which were not warmed. The cold air being drawn off from the third room only, the warm air passed through the other two rooms along the ceiling, being buoyed up by ths cold air in them, and entered and warmed the third room.

The PRESIDENT—How do you ventilate cars?

Col. RUTTAN described the process for winter and also for summer ventilation, in each case the air being drawn from the lower part of the car and being supplied above.

Mr. STETSON said that, in the ordinary ventilation, taking the air from the top of the room, as the heated air immediately rises to the top of the room the lower part of the room is poorly warmed. In a car, he had found a thermometer to stand at 110° at the top of the car and at zero at the bottom. While our heads, therefore, suffer from the heat, our feet are cold. Col. Ruttan's process always takes out the coolest air in the room, which is not only the greatest economy, but allows the room to be completely filled with the warm air.

Mr. JOHNSON inquired what was the economy of fuel?

Col. RUTTAN stated that he was warming his house in Canada—a two-story house—at an expense of 25 cents per day, using coal at $5.50 per tun. The ceilings were altogether too high for that climate; for in a cold climate, they should never be higher than 9 feet. It takes considerably more than double the fuel to heat a room 12 feet high than if it were 9 feet. The open stairway, which is copied from southern Europe, is totally unsuitable for a cold climate. Every staircase should be so closed as to prevent the air from going up to warm portions of the house where the heat is not required. With a close hall, low ceilings and a true ventilation, you may defy the cold and the doctors too.

Mr. GARBANATI regarded the saving to the health as being by far the most important advantage of the proposed system of ventilation. It cannot be healthy to have the feet in an atmosphere so much lower than that which surrounds the head. What is needed is a system of ventilation which equalizes the heat, as this system claims to do.

COTTON AND SUBSTITUTES THEREFOR.

The subject for the evening, the "Mechanical and Chemical Properties of Cotton, and Substitutes Therefor," was then taken up.

Mr. STETSON said that the first reason why cotton was so extensively used was its cheapness. Nature produces this fibrous material ready to our hands, and all that we have to do is to reach forth our hand and take it. There is no rasping, or pounding, or grinding necessary to prepare it. Another reason is the uniformity in the length of its fiber. Different varieties have a fiber of different lengths, that of the Sea Island cotton being long and fine. The average of upland cotton is about three-quarters of an inch, and the variation between the length of the different fibers of the same variety is less than one-fourth of an inch. Other materials, as hemp, have a much longer fiber, which is convenient in coarse work, but will not answer for the purposes to which cotton is applied. In the manufacture of cotton it is passed through a series of pairs of rollers, each revolving twice as rapidly as the next before it, which draws it out to a great length and with uniformity. No other fiber can be drawn out upon that principle to the same extent. After being passed through the rollers once, a dozen or more threads are placed together and passed through again; and so on, until each ultimate strand of cotton thread has been passed through several thousand times. Another property of cotton is its adhesiveness, which gives it strength and enables us to draw it out to extreme fineness.

Mr. PELL read a paper upon the history and character of cotton, flax, hemp and other fibers. The filaments of cotton are from half an inch to two inches in length, and less than the two-thousandth part of an inch in diameter. Cotton entirely fails 425 miles from the salt water. Its qualities are length of fiber, fineness, softness, strength, equality of filaments and freedom from impurities. By means of a powerful achromatic microscope, it may be seen that, while the fibers of flax are cylindrical and jointed like a cane, those of cotton are flat, not jointed, and twisted similar to a corkscrew. Cotton may be distinguished from all vegetable fibers by this corkscrew form. Among the plants yielding fibers of sufficient strength to be made into thread are the golden rod, the sunflower, the nettle, the swallow wort, the broom, the aloe, and sundry plants of the lily tribe. Wool has many advantages over all other materials used for clothing. It is a much better non-conductor of heat than cotton or linen, and when worn next the skin, tends to preserve us from sudden changes of temperature, and also from malaria and epidemic influences. Of all known fabrics, silk is the most conspicuous. Two pounds of cocoons will produce a thread 1,176,000 feet long. More than 1,600,000 people derive their entire support from the culture and manufacture of silk.

Mr. SEELY said that attention had been called only for a few years to the chemical nature of cotton. Gun cotton, when first known, was generally considered valuable as a substitute for gunpowder. This idea has now been abandoned; but it has certain advantages, which will still make it valuable for particular cases, perhaps, for instance, in charging shells. It is unaffected by moisture, is more explosive, is more easily prepared, and the materials may be more readily obtained. But gun cotton has another value, for it is the foundation of the art of photography as it now stands. It has been suggested that cotton should be dissolved in hydrocholoric acid, that any desired form should then be given to it and the acid evaporated. This can be done, but the cotton thus precipitated has no strength. Its strength is caused by its fibers. The composition of cotton, sugar, starch, gum arabic, dextrine and woody fiber is chemically the same, O_{12} C_{10}

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H_{10}. Gun cotton is chemically different. Two or three atoms of hydrogen are taken away and two or three atoms of the peroxyd of nitrogen, NO_4, are substituted. Yet this change does not affect the appearance of the cotton, even when examined by the most powerful microscope. But upon trying it with the polariscope, we find that the effect upon polarized light is precisely the reverse of that produced by the ordinary cotton. Dr. Van der Weyde states that he has converted cotton into sugar. The cotton is boiled in an acid for some time. First it is changed into dextrine, and then into sugar; but it is grape sugar, and will not crystallize. The composition of sugar is nearly the same as that of cotton and woody fiber; it is O_{12} C_{12} H_{12}.

Mr. PELL stated that in Lowell, within the last year, a pound of cotton had been spun into a thread 358 miles long.

Mr. SEELY had seen a statement that, in England, 1,096 miles had been reached; but that seemed hardly credible.

Mr. BABCOCK said that cotton is also valuable because it is soft and elastic, and hence it is used in cushions and for similar purposes. It is also used in a form in which it is harder than iron itself, for the rollers of calendaring machines. Compressing cotton by hydraulic pressure, a roller is produced so hard that it can be turned like iron in the lathe, and forms a polished, smooth surface, so hard and elastic that, even with a sledge hammer, no permanent indentation can be made. The rollers are manufactured in Providence, R. I.

Mr. GARBANATI remarked that as wool could not be profitably grown for clothing alone, and the demand for the meat is limited, wool must be limited in its production. Silk is expensive, and must be confined to special uses. Flax is objectionable because it is too good a conductor of heat to be worn next to the skin. Hence it is important to find some substitute for cotton, so that we may not be dependent upon a single locality for our principal clothing material.

Mr. DIBBEN expressed the opinion that cotton is naturally more durable than flax, hemp and similar materials, because the latter are not in their growth exposed to the weather, and hence not protected from it; while cotton and wool are naturally weather-proof.

Mr. BUTLER explained the practical operation of cotton spinning, in order to show the difficulties in the way of the introduction of any new material. Cotton machinery, as a whole, is more perfect than any other machinery in the world. The cotton can be picked from the plant, and in 24 hours woven into cloth; and this cannot be done with any material requiring rotting, hatcheling, mixing up, or such processes. As time is money, this is an important consideration. If a manufacturer were to have five per cent of Sea Island cotton mixed with the medium upland to which his machinery is adapted, he could not use it. The fibers being too long, would be broken by the rollers. It would take a century to produce complete working machinery for a substitute for cotton.

Mr. PELL prophesied that, in less than fifteen years from this time, flax will be used wherever cotton is now used for a mixture with woolen. He described a steam cannon, 20 feet long, which would instantaneously convert flax into a substance so nearly resembling cotton as to be indistinguishable from it without the microscope.

Mr. J. R. HASKELL exhibited specimens of the flax cotton produced by the process just described. He had tried it with cotton machinery, and had came to the conclusion that it would not answer for that. Upon mixing it with wool, half and half, it worked as well as cotton; and he had been told that the article thus produced was superior to all-wool, being susceptible of a higher finish. In woolen machinery, in all probability the flax cotton could be spun into threads alone. Satinet has the warp of cotton and the filling admixture; he should propose to have the warp and filling alike, half flax and half wool.

Mr BUTLER thought that, for admixture with wool, this flax cotton would be valuable, but not as a substitute for cotton. He would not discourage its production by any means. The fibers range from half an inch to three inches in length, which would not do at all for cotton machinery. The samples exhibited he should judge to be weaker than cotton.

Mr. HASKELL stated that the mode of producing that cotton is this. The cannon is filled with flax and water, under a considerable pressure, so that the moment the pressure is removed the water flashes into steam, completely separating the fibers of the flax from each other, as the whole contents are discharged into the atmosphere. A second operation had been proposed, but seemed unnecessary.

The same subject was continued for the next meeting, and Professor Mason expressed his intention of making some remarks upon it.

Mr. Pell and Professor Mason also expressed their intention of taking up the subject of "Projectiles" during the hour for miscellaneous business.

On motion, the meeting adjourned.

Recent American Inventions.

The following inventions are among the most useful improvements lately patented:—

HYDRANT.

The desiderata in an invention pertaining to hydrants and which this invention is designed to supply are, first, that (in our climate) the operating parts be so arranged that the water, when at rest, will be perfectly protected from frost; second, that no water be allowed to run to waste, both on account of its value and the damage waste water is liable to cause to the premises near which it may be discharged; third, that the hydrant re-act automatically, that is to say, be self-closing, so that the water may not be left running, either by evil design or carelessness; fourth, that it shall, by its own operation, keep itself free from all sediment, or, in other words, be self-cleaning; fifth, that it shall not require to be removed from the ground in order to effect any repair it may need; sixth, that it may be opened with facility or with a small effort of strength; seventh, that it may close in such a manner as to produce the least possible strain or shock to the back pipes; eighth, that it may be convertible, at will, into a fire hydrant, a street or garden sprinkler, or a window washer, by simply attaching a hose; ninth, that nothing can be introduced into its interior, to obstruct the action of its mechanism; tenth, that it be compact, free from external projections or prominences, that it will not be exposed to external accidents, and be capable of being conveniently adjusted in the desired position; eleventh, that it open with the same ease, re-act or close in the same manner, and be equally durable, under all pressures; and, twelfth, that no particular one of its parts be subject to a relatively excessive or special wear, By this invention, patented by James P. Kenyon, of Brooklyn, N. Y., it is believed that the above-named advantages are fully secured.

APPARATUS FOR SIZING SILK, &C.

This invention is intended more especially to be used in connection with that kind of apparatus for gaging or determining the size of a thread, which constitutes the subject-matter of Letters Patent granted to John E. Atwood, dated April 12, 1859, but may be, for the most part, applicable in connection with other gaging devices. It consists principally in certain devices constituting a stop motion, employed in combination with a bobbin on which the thread is taken up from the gaging apparatus, for the purpose of stopping the drawing of the thread through that apparatus on the occurrence of a variation in size beyond certain limits, so that by the use of two or more bobbins, each to take up all the thread between certain limits, and the changing of one for another whenever the stop motion acts, the sorting into as many different thicknesses between certain limits as may be desired, or, as it is technically called, "sizing" is effected. This apparatus was patented by John E. Atwood, of Mansfield Center, Conn., and Lewis Leigh, of Seymour, Conn.

GRINDING MILL.

This invention relates to an improvement in that class of grinding mills in which a cast metal, conical grinder is placed within a shell of corresponding form. The chief difficulty attending the operation of this kind of mill has been the producing of uneven work; that is to say, portions of the article being ground are discharged much coarser than others, and the mill, while working rapidly, produces inferior work. In order to obviate this difficulty, diagonal teeth or projections have been used in connection with the ordinary or grinding surfaces, said teeth or projections being designed to arrest the progress of the article being ground through the mill, and thereby insure its reduction to a proper, fine state before its discharge. This arrangement has not been generally adopted, as it creates as great a difficulty as the one it was designed to obviate, to wit, the choking or clogging of the mill. This class of mills, also, has been hitherto liable to heat, and soon becomes worn and unfit for use. This invention consists in having the rotating grinder, and also the shell, formed of a series of concentric rings, corrugated or toothed at their peripheries, each ring of the grinder, in connection with its fellow ring of the shell, constituting a distinct grinding device, the article to be ground passing consecutively through the series of grinding devices. By this arrangement, the above-named difficulties are avoided, while the advantages of this class of mills, to wit, rapidity of grinding, in connection with economy of construction, are retained. This mill is the invention of William Stewart, of Philadelphia, Pa.

MACHINE FOR SIZING SILK, &C.

This invention consists in a device for gaging or indicating the thickness of a thread of silk or other fibrous material, composed of two surfaces so arranged in relation to each other that in drawing a thread between them, its finer portions will leave one or both of them stationary, but its coarser portions will fill the space between them and so, by its friction, give motion to one or both of them. It also consists in certain mechanism operating in combination with such device for the purpose of stopping the operation of drawing the thread between its gaging surfaces as the portion of the thread passing between them increases from a smaller to a greater, or diminishes from a greater to a smaller thickness than that for which the gaging surfaces are adjusted, viz: the supposed average thickness of the whole quantity to be sorted or "sized." The credit of this invention is due to Goodrich Holland, of Willimantic, Conn.

ICE CREAM FREEZER.

This invention consists in the combination with the can, of an agitator which is so arranged that on giving motion to the beater or other device for the purpose of agitating the cream in the can, said agitator is caused to pass through the ice and salt outside the cylinder, forming and keeping up such a perfect combination, that the cream is constantly surrounded by a freezing mixture of a temperature at or below zero, for it is well known that ice alone has a temperature of 32 degrees above zero, but when made fine and thoroughly incorporated with salt, the liquefying or cooling process immediately takes place, by which the temperature is reduced 34 degrees, or to 2 degrees below zero. This degree of cold, however, can be kept up by constant stirring only, which fact accounts for the value of this agitator. E. P. Torry, of No. 9 Platt-street, this city, is the inventor of this freezer.

VAPOR BURNER.

This improved burner is intended for burning the vapor of alcohol or other volatile hydro-carbon liquid, but more especially of alcohol, for cooking or heating purposes. It consists of an inner perforated tube and an outer perforated tube, of metal, having between them an annular space filled with emery or other granulated mineral matter of sufficiently indestructible character to bear a red or nearly red heat without injury, and having a broad disk or flange at each end. The burner thus constructed is arranged in an upright position, and the alcohol or other fluid being supplied from a fountain or reservoir to the lower end of the inner tube, is evaporated, and its vapor is consumed on the surface of the outer tube and between the disks or flanges. Russell R. Lewis, of this city, is the inventor of this burner.

CAR WHEEL.

This invention relates to an improvement in what are generally termed "single plate wheels," and consists in having a continuous rib on the inner diameter of the rim of the wheel, directly opposite or in line with the flanch, said rib being used with braces to connect it with the plate. The obect of the invention is to increase the strength of the rim of the wheel, the part most requiring strength, without materially increasing its weight, and consequently without injuriously affecting the wear of the tread, the latter contingency being due to an increased weight of metal, which prevents the sudden chilling of the tread and, therefore a proper degree of hardness. George G. Lobdell, of Wilmington, Del., is the patentee of this invention.

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Patent Claims

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 19, 1861.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

428.—Rufus Anson, of New York City, for an Improvement in Baths for Toning Photographic Pictures:

I claim the use of bichloride of mercury in combination with the above or similar ingredients (equivalent thereto) in forming a bath for toning photographic pictures.

429.—J. M. Bacon, of Ripon, Wis., for an Improvement in Seeding Machines:

I claim the arrangement of the seed box, D, the shaft, J, the wheels, a a, provided with cups and constructed on their periphery as described, and the discharge spouts, on each side of the wheels, with the bars, G, the troughs, H, and the cultivator frame, E, regulated and used as described for the purpose set forth.

430.—Louis Ballman, of Boston, Mass., for an Improvement in Sewing Machines:

I claim a gate or hinged bobbin support provided with journals for the pivots of the bobbin, in combination with a shuttle or bobbin case, the two being so connected that the journals can be moved out of the hollow of the shuttle, so that a bobbin may be removed therefrom, without detaching the support or gate from the shuttle, and the combination being substantially such as described.

And I also claim, in combination with a bobbin and a bobbin case or shuttle, an equalizing curve, constructed and placed substantially as described, and so arranged with reference to the bobbin and an eye through which thread is passed, that thread passing off of the bobbin and through the eye shall in its transit slide over the equalizing curve, the combination being substantially such as before recited to produce the effect before set forth.

431.—Hiram Barber, of Milpitas, Cal., for an Improvement in Gates:

I claim, in connection with the adjustable rails, B B′, the springs, G G, and plates, f f, arranged to operate substantially as and for the purpose specified.

[This invention relates to an improvement in that class of gates which are constructed and arranged with a view to admit of being opened and closed by a person in a vehicle or by a rider on horseback. The invention consists in the employment or use of adjustable guide rails on which the gate works in connection with springs and guides, whereby he gate when either in an open or closed state may be inclined so as to move by its own gravity in connection with an impetus given it by springs, and the gate opened and closed by simply actuating a lever which may be done by the driver of a vehicle or a rider on horseback.]

432.—Franklin Bisbee, of Scituate, Mass., for an Improvement in Masons' Trowels:

I claim the ferrule shaped and operating substantially as set forth, when combined with the handle and offset shank of a mason's trowel or other tool.

433.—Josiah Bishop, of Austin, Texas, for an Improvement in Machines for Extracting Cotton and Corn Stalks:

I claim the fingers, h k, either or both sets or series, when connected to a mounted frame, A, and operated by the draught movement of the same, substantially as shown, so as to have a backward and forward movement, and also an upward and downward movement, for the purpose specified.

I also claim, in combination with the fingers, h k, either or both sets or series, the cleaning bar, K, arranged relatively with the fingers, to operate as and for the purpose specified.

[The object of this invention is to obtain a simple and efficient machine for expeditiously eradicating or pulling up by the roots cotton and corn stalks, so as to render the soil free from stumps which are left by the usual process of cutting, and capable of being properly prepared for a succeeding crop. An engraving of this invention will soon appear n our columns.]

434.—Douglas Bly, of Rochester, N. Y., for an Improvement in Artificial Legs:

I claim the rounded or hemispherical termination of the leg at the ankle, with the recess, G, in the foot for the reception thereof, when combined and arranged with a joint-bearing having a universal motion on a single center, substantially as and for the purpose shown and described.

I also claim the stop or projection, m, when combined with a corresponding recess in the shell of H, substantially in the manner and for he purpose set forth.

435.—J. M. Brahn, of Red Bank, N. J., for an Improvement in Railroad Switches:

I claim the post, E, with its hook, m, arranged as set forth, so as to ock the switch rail tie, c′, to the sleeper, d, in combination with the levers, F F′, arms, t t′, transverse shafts, G G′, and vertical arms, s s s s, all arranged and operating in conjunction with the horizontal levers, k k, h h, and k′ k′ h′ h′, substantially as specified for the purposes set forth.

[This invention relates to a novel improvement for automatically operating the switch rails of a permanent railroad, so that as the train of cars approaches the switch in either direction certain appliances on the locomotive will operate the switch rail, and switch the cars on the desired track, where the switch rails will be securely locked and held in the desired position.]

436.—Salem Copeland, of Worcester, Mass., for an Improvement in Guards or Fingers for Reaping and Mowing Machines:

I claim, first, Sliding the steel plate or face of a cast or malleable iron guard under dovetailed projections on the body of the guard, substantially as and for the purposes set forth.

Second, I claim the combination of the curved and beveled projections, e e, on the steel plate, with the curved projections, c c, on the body of the guard, substantially as and for the purposes stated.

Third, I claim the combination of the steel plate or face, C, with the cast or malleable part, A, the parts being constructed and combined as and for the purposes set forth.

437.—Joseph Cragg, of Baltimore, Md., and Samuel Archbold, of Washington, D. C., for an Improved Surface Condenser for Steam Engines, &c.:

I claim, first, The form and general arrangement of the outside casing marked E, with the steam and water passages.

Second, The mode of making a water and steam-tight joint between the casing and spine plates.

Third, The mode of arranging the spine plates for the purpose of obtaining, with little cost, a large quantity of surface in a small space and a thorough circulation of the steam, water, or other elastic or non-elastic fluids using for the purpose specified, and apparatus as described.

438.—W. W. Cumberland, of Newark, N. J., for an Improvement in Hat Blocks:

I claim, first, The fastenings, G H I and J, attached to the sides of the center piece, A, in combination with the fastenings, G′ H′ I′ and J′, let into grooves formed in the other pieces of the block of a corresponding cross section and corresponding taper with the fastenings, G H I and J, the fastenings in the grooves being so adjusted in position that their inner surfaces shall come in contact with the inner surfaces of the fastenings, G H I and J, and their points come in contact with the projections on the opposite fastenings, at the same time that the sides of the fastenings, G H I and J, come in contact with the sides of the grooves, so as to wedge the fastenings attached to the center piece on three sides, and wedge the pieces of the block together and insure the proper position of the several parts of the block with regard to each other, substantially as described and for the purpose set forth.

Second, In combination with fastenings attached to the center piece, I claim the arrangement of one or more spring catches, having their upper ends bent back into the finger space, and so placed that the springs will be relieved from their corresponding notches in the side pieces by grasping the upper ends of the springs when the center piece is grasped, so that one or more of the spring catches can be released by the same hand of the workman that is used to withdraw the center piece while his other hand can be used to hold down the outside pieces of the block when he is withdrawing the center piece.

Third, In combination with the metal fastenings attached to the sides of the pieces, I claim preventing the points of the downward projections, K, of the fastenings attached to the center piece from wearing away the sides of the grooves in the blocks (when formed of wood) with which they come in contact, by means of a slot in the end of said projections, and a screw passing through the corresponding part of the fastenings in the grooves and secured in the wood in the bottom of the grooves, the smooth neck of which shall enter the slot and fit it on the the two sides when the parts are in proper position, substantially as described and for the purpose set forth.

439.—C. H. Denison, of Brattleboro, Vt., for an Improved Felloe Machine:

I claim, first, The adjustable plates, n p, provided with the pins, o q, when used in connection with the plate, G, and cutter head, F, as and for the purpose set forth.

Second, The combination of the adjustable semi-circular bed or bearing piece, I, and yielding bar, J, with the cutter head, F, plate, G, and bars, n p, provided with the pins, o q, all being arranged for joint operation as and for the purpose set forth.

[The object of this invention is to obtain a machine by which the inner sides of felloes for wheels may be very expeditiously rounded and the work done in a proper manner, both the sawed and the steamed and bent felloes being operated upon with equal facility. See engraving on page 353, Vol. III., of the SCIENTIFIC AMERICAN.]

440.—P. F. Dodge and W. S. Dodge, of West Cambridge, Mass., for an Improvement in Taking Photographic Pictures by Artificial Light:

We claim the combining with an artificial light, and one or more series of reflectors, of an intercepting medium or plate, when so arranged with respect to the object and the light and reflectors as to intercept or soften the dazzling rays from the light, and allow the unobstructed rays to pass from the light upon the reflector and thence upon the sitter, substantially as described.

We also claim the peculiar arrangement of the upper and side reflectors together, so that the side reflectors cast their reflected rays upon the object, while the upper reflector casts not only the rays thrown upon it by the light upon the object, but also throws upon the object the reflected rays from the side mirrors, all as set forth.

441.—Richard Donaldson, of Mount Nebo, Pa., for an Improvement in Lime Kilns:

I claim the arrangement of the conic cooler, F, with its rim or flange, f, guide rods, m, bladed levers, L, and lid, G, in combination with the kiln, the whole constructed and operating in the manner and for the purpose substantially as described.

442.—H. C. Drew, of Stockbridge, Mich., for an Improvement in Capstans for Plows:

I claim the arrangement of the spring rack, G, with the blank-sided driving gear wheel, D, pinions, E E, and drivers, F F, all as shown and described for the purpose set forth.

[This invention consists in a novel arrangement and combination of two or more drums or capstans, around which the chains pass that connect with the grabber, with pinion spur wheel and a large spur wheel, with the teeth on the latter extending only part of the way around its circumference, the whole being arranged in such a relation to the draught pole, to which the animals are attached, that they will not be compelled to walk over a tight chain, but so that the large spur wheel will act upon the drums alternately.]

443.—Peter Dunwald, of Corning, N. Y., for an Improved Churn:

I claim the axis, c, provided with the washer, 6, kept to the end of the pipe, 3, by a spring, 7, said axis, c, screwing into the socket, 4, on the dasher, b, as and for the purposes set forth.

444.—B. H. Elmore, of Richmond, Ind., for an Improvement in Corn Planters:

I claim the combination of slides, U and W, and spring valve, V, with strap, S, slide, O, cam, N, shaft, J, and wheel, H I, the whole being constructed and operated substantially as set forth.

445.—S. T. Field, of Worcester, Mass., for an Improved Process for Manufacturing Wooden Eave Troughs and Piping:

I claim the mode or process described of manufacturing wooden eave troughs and material for tubular conductors at one and the same operation, and from the same stick of timber.

446.—A. L. Fleury, of Philadelphia, Pa., for an Improvement in Tools Used in the Manufacture of Iron:

I claim a hollow stirring tool, A, provided with a removable cap, B, and otherwise constructed substantially as shown and described.

[This invention consists in a tool for the introduction of salts or other solid substances, or liquid or gaseous matters, among the iron or ore in a puddling or other furnace or fire used in the manufacture of iron.]

447.—L. P. Garner, of Ashland, Pa., for an Improved Machine for Breaking Coal:

I claim the combination of the toothed rotating face plate, C, and toothed cylinder or roll, H, the whole constructed and operating as described, for the purpose set forth.

448.—J. K. Gingrich, of North Annville, Pa., for an Improvement in Plows:

I claim the arrangement of the driving wheel, L, elevating rod, P, swinging rod, N, connecting rod, L′, crank, h, clearer, k, beam, G, rod, h, crank, I, spring, J, and handles, F F′, with the plow body, A A′ B B′ C D D′, as and for the purpose shown and described.

[This invention and improvement in plows consists in a novel mode of forming and putting together the several parts composing the body of the plow, whereby the front cutting edge of the landside may be removed and reversed when an edge becomes worn out, and this cutter, with the landside wing, may be attached to the moldboard without using bolts, pins or screws. It also consists in a novel means of transferring the draught from the front end of the beam to the back part therof behind the plow standard, and of adjusting the draught bar at this point and giving to it a yielding motion. It further consists in the employment of a self-cleaning device for preventing the plow from clogging with weeds, &c., at the point where the standard connects with the beam.]

449.—R. Goldenblum and F. Steiner, of East Hampton, Mass., for an Improvement in Compositions for Waterproofing Leather:

We claim the composition made of fish oil, india-rubber dissolved in spirits of turpentine, petroleum, rosin, pitch, beeswax, tallow, common soap and lard, as described.

[The object of this invention is to produce a composition which, when applied to leather, will preserve the same, and at the same time make it perfectly impervious to water.]

450.—J. C. Gray, of Frankfort, Ind., for an Improvement in Beehives:

I claim the described arrangement of bee chamber, A, pedestal, B, moth trap, C, mineral floor, E, having the described upward and downward apertures, F G, and breeding boxes, H, whose floors, J, are elevated from the floor, E, by metallic rims closely fitting the said floor, in the manner and for the purposes set forth.

451.—John Griffin, of Louisville, Ky., for an Improvement for Changing the Speed of Steam Carriages:

I claim the arrangement, essentially as shown, of the steam cylinder, e, hung on trunnions, f, in connection with the reciprocating frame, F, air pump, G, pitmen, H′ I′, and gearing, l m, whereby the speed of the carriage may be changed from fast to slow, and vice versa, as occasion may require.

452.—E. A. Hearne, of Lowndes County, Ala., for an Improvement in Cotton Cleaners:

I claim a revolving drum armed with a series of paddle-shaped beaters, arranged in straight lines all around the drum, combined with a central feed hole and discharge spouts, situated near each corner on the back side of the box the drum revolves on, as substantially described.

453.—B. F. Hebard, of Neponset, Mass., for an Improvement in Burning Fluid Compositions:

I claim the composition of fusil oil, kerosene and spirits of turpentine, and its combination with a perfuming essential oil, as set forth.

454.—Goodrich Holland, of Willimantic, Conn., for an Improvement in Machines for Sorting Silk and Other Thread:

I claim the combination of the rocking frame, J, and weighted tumbler, n o p, with the roller, N, and bobbin, C, in the manner substantially as shown and described.

I also claim providing the periphery of the roller, N, with a screw thread, m, as and for the purposes set forth.

The combination of the screw-threaded roller, N, and a chaser, h, with the roller, M, in the manner substantially as shown and described, so that, when the size of the passing thread increases, the roller, N, and its screw, m, will be rotated and carry the chaser out of the screw, and thereby cause the stoppage of the thread-winding bobbin, all as set forth.

455.—Edward Holmes and Britain Holmes, of Buffalo, N. Y., for an Improved Stave Machine:

We claim, first, Connecting the cutter frame, G, to the stationary or gear frame of the machine, by means of flexible or yielding connections, H and I, so as to admit of the oscillation or movement of the cutter frame in any direction, according to the peculiar requirements of each stave to be dressed, substantially as set forth.

Second, We claim the arrangement of the flexible mouthpieces, P and P′, in the cutter frame, G, substantially as described, in combination with the flexible connection of said cutter frame to the stationary or gear frame of the said machines, as set forth.

456.—M. R. Hubbell, of Wolcott, Vt., for an Improved Vegetable-cutter:

I claim the knives, C D E F, and platform, b, carried in a reciprocating frame, and arranged to operate in connection with the hopper, G, and crossbar or partition, H, substantially as set forth.

457.—J. W. Hyatt, Jr., and I. S. Hyatt, of Chicago, Ill., for an Improved Knife-sharpener:

We claim the combination of the wheel, D, and springs, J J, or equivalent pressing device, with the wheels, G G′, in the manner shown and described.

[This invention is a rotary knife-sharpener, intended to operate upon both sides of the edge of a knife at one and the same time. The invention consists in the employment of twin wheels or cylinders mounted in bearings in a suitable frame, and operated upon by a spring or springs, so that their peripheries will be made to touch each other; and also operated by a large smooth-faced wheel, whereby they receive their rotary motion in opposite directions; said twin wheels or cylinders are to be made of stone, or to have their peripheries thickly covered with a composition containing emery, so that, when a knife is placed between them, they being rotated, it will be operated upon by each wheel, and its edge will be ground uniformly on each side at the same time.]

458.—D. A. Johnson, of Chelsea, Mass., for an Improvement in the Mode of Uniting the Spokes and Felloes of Wooden Wheels:

I claim as new in coupling spokes with the parts of felloes of wooden wheels, by means of a metallic band, in the manner described, at each or any of the spokes, and conical pin or wedge for expanding the end of the spoke, constructing said band with an hour-glass-shaped cavity for reception of the spoke, and making the band to cover or overlap the outer end of the spoke, substantially as shown and described.

459.—Daniel Kaufman, of Boiling Spring, Pa., for an Improved Broom:

I claim the employment of clamps, A, consisting of two plates, a b, screws, c, and rings, d, in combination with the slotted end of a broom handle, B, constructed and operating as and for the purpose specified.

[This invention consists in the arrangement of clamps consisting of two plates, the ends of which are made to slide one into the other, and which are united and fastened to the broom by means of screws screwing from opposite sides into rings, in combination with a handle the inner end of which is slotted to receive one of said rings in such a manner that, by means of said clamps, the broom can be fastened to the handle with ease and facility.]

460.—J. P. Kenyon, of Brooklyn, N. Y., for an Improvement in Hydrants:

I claim, first, The arrangement of the chamber, J, central tube, L, shoulder, o, or its equivalent, with the plunger, H, provided with the chamber, K, packing, M, and tube, G, the latter being in communication with the chamber, J, tube, F, and spout, D, substantially as and for the purpose set forth.

Second, The handle, E, crankshaft, C, and yoke, c, when used in connection with the plunger, H, chamber, J, tube, L, and their concomitant parts, all arranged for joint operation as set forth.

461. J. G. Leffingwell, of Newark, N. J., for an Improvement in Gas Cocks:

I claim the combination of set screw or screws and lever with a gas cock, constructed substantially in the manner and for the purpose specified.

462.—R. R. Lewis, of New York City, for an Improvement in Vapor Burners for Heating, &c.:

I claim the burner composed of the inner and outer perforated tubes, A B, the disks, a a, and the granulated mineral filling in the annular space between said tubes, the whole combined substantially as and for the purpose specified.

463.—G. G. Lobdell, of Wilmington, Del., for an Improvement in Railroad Car Wheels:

I claim, in single plate wheels, the construction of the flanch, D, with an inner rib, E, arranged and employed in relation to the said flanch and the remaining portions of the wheel, in the manner and for the purposes described.

464.—W. A. Ludden, of Brooklyn, N. Y., for an Improvement in Smoking Tubes:

I claim a telescopic smoking tube, composed of a sliding tube or shell, A, perforated piston or tube, B, and mouthpiece, C, the whole made as shown and described.

[The object of this invention is to provide the means for smoking fine cut tobacco, commonly known as Turkish tobacco, put up in charges of a peculiar shape and construction in a convenient and agreeable manner.]

465.—J. G. Manley and F. Wedge, of Zanesville, Ohio, for an Improved Earth-boring Machine:

We claim, first, The arrangement of a screw shaft, D, with a slip coupling, F G, in combination with an auger, M N O, substantially as and for the purposes set forth.

Second, The combination of a screw shaft, D, of an auger, M N O, with a swinging nut, A, and a frame, P C, substantially as and for the purposes set forth.

[This invention is for boring holes for the insertion of fence posts and analagous purposes. The particular objects of the improvements are to

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adapt the instrument to bore vertical holes on hill sides or in sloping or uneven ground, and to insure the thorough removal of the loose earth from the hole in the act of withdrawing the auger.]

466.—J. B. McIntosh, of Girard, Pa., for an Improvement in Machines for Loading Hay:

I claim the employment of the cam, P, constructed and operating as described, in combination with the tooth bars, b, to discharge the hay on to the endless apron, O, in the manner and for the purpose specified.

Second, I also claim the arrangement of the frame, N′, with the adjustable hood, z, in combination with carrier, N, and endless apron, O, in the manner and for the purpose specified.

467.—Thomas Mitchell, of Lansingburgh, N. Y., for an Improved Machine for Boring Brush Blocks:

I claim the feeding apparatus as described, in combination with the series of bits, substantially as and for the purpose set forth.

468.—Charles Monson and Stillman Moore, of New Haven, Conn., for an Improvement in Gas Burners:

We claim the use of the double ubes, A and B, so as to be readily adjusted in their rotary without changing their longitudinal position, when constructed, arranged and fitted as and for the purpose substantially as described.

469.—Daniel Moore, of Brooklyn, N. Y., for an Improvement in Firearms:

I claim, first, The gudgeon, c, provided with a head, and taking the semi-circular notch in the projection from the barrel, in combination with the spring, d, and the ribs and grooves, 1 and 2, for the purposes and as specified.

Second, I claim the slide, i, formed as a fork, and provided with the perforated sole piece, 3, and semi-circular groove, to take the flanged base of the cartridge, as set forth.

470.—Peter Murray, of Detroit, Mich., for an Improvement in Steam Engines:

I claim constructing and furnishing the cylinder of the engine with a system of separate induction passages, ports and valves by which the superheated and ordinary steam are admitted separately to the cylinders, substantially as and for the purpose specified.

471.—L. M. Parker, of Shirley Village, Mass., for an Improved Fruit-gatherer:

I claim my improved fruit-picker as made of a series of wires, bent and arranged in manner and connected with a shank or pole socket, substantially as specified.

472.—Hiram Powers, of Florence, Italy, for an Improved Punching Machine:

I claim the shoulder, a, and cog, b, of the lever, acting in combination upon the notched shaft, No. 3, in which the punch, shaft or cutting instrument, c, is inserted, operating as specified and described, for punching, stamping and cutting metal and other hard substances.

473.—Daniel Ruggles, of Barras, Mass., for an Improvement in Brakes for Sewing Machines:

I claim of a frictional brake, with suitable levers, and the pin or key, d, in combination with the driving balance, or other rotating wheels, and the table of a sewing machine, substantially as and for the purposes specified.

474.—W. C. Salmon and G. F. Bliss, of Placerville, Cal., for an Improved Machine for Upsetting Tire:

We claim the combination of the stationary and movable bed plates, A′ and B, their clamping dogs, E and F, and jaws, D and D′, as set forth, with the spring, G, sector, H, and cam, J, with its lever, J′, all arranged and operating in the manner and for the purposes set forth.

[This invention consists in a combination of stationary and movable bed plates, having clamping jaws on them for grasping and holding the tire securely, with a sector and cam lever for shrinking the tire after it is properly clamped to the beds, and a spring which throws the movable jaw back after it has been acted upon by the cam and sector.]

475.—Gelston Sanford, of New York City, for an Improvement in Machines for Treating Vegetable Fiber:

I claim the arrangement of the feed rollers, B B, the brushes, the belts, D D, armed alternately with teeth and scrapers, as shown, and the carrying rollers, E, the whole being also arranged to operate in reverse directions at will, as set forth.

476.—S. T. Savage, of Albany, N. Y., for an Improvement in Stoves:

I claim the employment of the base burning chamber, B, external case, A, and partitions extending from x to x′ and from z to z′ arranged as represented, whereby an indirect draft is produced around the front, the sides and the back of the stove, in the manner and for the purpose specified.

477.—H. G. Scofield, of North Stamford, Conn., for an Improvement in Sewing-work Holders:

I claim the open-ended buckle, C C′ G, as a new article of manufacture, when adapted to receive the edge or a fold in the cloth, B, to allow it to be drawn forward at will and to be introduced and removed, substantially as and for the purpose set forth.

478.—Jacob Shavor and A. C. Corse, of Troy, N. Y., for an Improvement in Gridirons:

We claim the downward projecting side, D′, and the downward projecting side, D, in combination with the reservoir, c, as described and set forth.

479.—P. B. Sheldon, of Prattsburgh, N. Y., for an Improvement in Roll Blotters:

I claim the combination of the two rollers, a a, arranged in a suitable holder, b c f, either with or without the supplementary roller, h, substantially as and for the purpose specified.

480.—Josiah Shephard, of Columbia, Texas, for an Improvement in Cotton Scrapers:

I claim, first, The curved runners, C C, arranged and constructed as described, and in combination therewith the scraping plates, D D, when attached to the runners by pivoted arms, d d, brace rods, g g, and bolts at c c, substantially as and for the purposes set forth.

Second, I claim the jointed beams, E E, carrying plates, k k k′ k′, and otherwise constructed and arranged, as and for the purposes specified, when combined with the runners, C C.

This invention consists in attaching to two curved runners two scraping wings which scrape the sides of the rams and leave them free from weeds, said scraping wings being so attached to said runners that they may be readily adjusted so as to increase or diminish the space between their front ends. It further consists in the employment of a frame, carrying plates which are curved inward, pivoted to the front standards of the aforesaid runners, and working between said runners for the purpose of earthing or throwing earth about the roots of the plants during the operation of thinning or scraping.]

481.—J. H. Simonds, of New York City, for an Improved Hot Air Register:

I claim the attaching of the racks, D, to the slide, E, at points substantially as shown, so as to admit of the sectors, C, gearing into the racks, D, and at the same time admit of the inner edge of the slide serving as inner bearings for the journals, a, at one end of the valves, as set forth.

[Registers for hot air and venti-ducts, as hitherto constructed, have had their slats or valves so arranged as to work entirely within a box which projects within the flue or ducts, and serves as a great obstruction to the same. The object of this invention is to obviate this difficulty and also to obtain a better means than usual for operating the slats or valves, and keeping them in proper position within the box.]

482.—J. B. Smith, of Winfield, N. Y., for an Improvement In Harvesters:

I claim the arrangement of the removable inclined bar, T, with the shoe, S, and roller, V, as shown and described.

483.—W. H. Smoote (assignor to himself, Franklin Taylor, C. A Nelson and Montreville Cornell), of Prince William County, Va., for an Improved Method of Making Wooden Vessels of Staves:

I claim forming barrels, casks, and other vessels of wood without external hoops, by the mode described and set forth and for the purposes mentioned.

484.—W. W. Snow, of Jersey City, N. J., for an Improvement in Car Wheels:

I claim uniting the hub and rim of a car wheel by two plates, the front one being corrugated near its perimeter so as to cross the rim or tread in a waved line, and the back plate being convex and uniting with the flange, and the whole constructed substantially as set forth and for the purpose specified.

485.—James Spear, of Philadelphia, Pa., for an Improvement in Cooking Stoves and Ranges:

I claim the combination of the sifting and ash drawers, A and B, with the curved or guide plate, D, when used in connection with a stove or range in which the oven extends under the fire grate.

486.—P. H. Standish, of Pacheco, Cal., for an Improvement in Harvesters:

I claim the arrangement of spring, f, wedge, d, and guide, I, with the frame, A, shaft, F, pallet bar, H, and scolloped wheel, E, in the manner and for the purposes set forth.

[This invention relates to certain improvements in the sickle-driving mechanism, which is of that class having a serpentine cam and pallets. The object of the invention is to allow a certain degree of play or yielding movement to the axes of the pallets, and, at the same time, render the pallets easily adjustable, so that they may be readily thrown in and out of gear with the cam.]

487.—F. J. Steinhauser, of Lancaster, Pa., for an Improvement in Snow Plows:

I claim the circular breakers, A, and shovels, B, together with the ice breakers, F and G, as arranged in combination with the ordinary snow plow, D, for the purpose of removing snow and ice from railway tracks.

488.—William Stewart, of Philadelphia, Pa., for an Improvement in Mills:

I claim the construction of the grinder with a series of conical toothed rings or concaves, E, placed one above the other within an exterior conical case, D, and a series of conical, grinding, toothed rings, C, placed one above the other upon a cone, B, the whole arranged and operating in the manner and for the purpose shown and described.

489.—J. R. Supplee, of Bridgeport, Pa., for an Improvement in Radiators:

I claim having the openings at the under side of the drum, A, of the conical or straight pipes, B B, made larger in proportion to the distance from the cold air flue, F, also similar openings around the sides and ends of the drum, thereby equalizing the draft through all the heating surface, substantially as described.

490.—William Taylor, of Berlin, N. Y., for an Improvement in Guides for Laying Cord:

I claim the hinged cording device constructed and operating substantially as described, and for the purpose set forth.

491.—Enoch Thomas, of Beverly, Va., for an Improvement in Presses:

I claim, first, The movable boxes, C, and collars, T, combined with the cam shaft, D, and wheels, F, in the manner and for the purposes set forth.

Second, The use of the detached followers, R, between the cams, E, and follower, H, in the manner and for the purposes set forth.

Third, The combination of the ears, J, toothed boxes, K, and spring ratchet clamps, L, operating to retain the follower, H, as explained.

Fourth, The oil plates, S, interposed between the cams, E, and followers, H or L, for the reduction of friction, as set forth.

[The leading object of this invention is to produce a continuous movement of the follower to any extent desired, by successive revolutions of the cam shaft. It is thought to combine the most important advantages which are regarded as peculiar to the cam and screw press respectively. The invention also consists in appliances for overcoming friction, facilitating the insertion and removal of material, and adapting the press to work equally well with a small or a large quantity.]

492.—W. H. Topham, of New Bedford, Mass., for an Improvement in Lamps:

I claim the arrangement of the flanched screw socket, H, and disk, c, with the band, b, tubes, D E F, and cap, I, in the manner and for the purpose shown and described.

The employment or use of the double armed spring, K, in combination with the cap, I, and spring, L, in the particular manner shown and described, for the purposes set forth.

I claim the arrangement of the rings or plates, G, to extend from the plate, c, to the inner surface of the cone or deflector, J, so as to inclose the flame, all in the manner and for the purposes shown and described.

[The object of this invention is to supply the flame with a requisite amount of oxygen to support proper combustion and to present the air to the flame in a warm state, so that the flame will not be cooled thereby.]

493.—E. P. Torrey, of New York City, for an Improvement in Ice Cream Freezers:

I claim the arrangement of a rotary agitator, F, or its equivalent, in combination with a can, A, and tub, D, of an ice cream freezer constructed and operating substantially in the manner and for the purpose specified.

494.—J. H. Totman, of Plattsburgh, N. Y., for an Improved Method of Hanging and Securing Reciprocating Mill Saws:

I claim the employment of the front gauze, c, the rear gauze, c′, the hook, d, and key, e, when these devices are constructed and operated in the manner and for the purpose specified.

495.—J. S. Wethered and S. E. Woodworth, of San Francisco, Cal., for an Improved Process for Treating the Ores of Precious Metals:

I claim the above-described process of treating ores, consisting of the use of steam in combination with a mixture of pulverized ore, carbon, a solution of salt, soda ash and mercury, in the manner and for the purpose as set forth.

496.—S. H. Whitmore, of Cincinnati, Ohio, for an Improvement in Steam Engines:

I claim, first, The above-described apparatus consisting of the sliding bar, the catches, hooks, plungers or lifters, and rod, 13, combined and arranged substantially as described, for operating the cut-off and exhaust valves of a steam engine.

Second, The application to the above apparatus, arranged substantially as described, of an automatic governor operating through the rod, 13, to trip the cut-off valves at any desirable point in the stroke.

Third, The reciprocating bar, 11, carrying the stationary catches for opening the valves, and by its return movement opening the exhaust by impinging against the cranks, 6 6, substantially as described.

Fourth, The plungers with their cylinders or slotted arms jointed to the rod, 13, for disengaging the hooks, 8 8, from the catches, 9 9, constructed substantially as described.

Fifth, The hooks, 8 8, when combined with the cranks, 6 6, and operated in connection with the catches, 9 9, substantially as described.

Sixth, The independent adjustable valve seat, 19 19 19, in connection with the oscillating valves, 1 1, substantially as described.

Seventh, The hollow-throated valves, 1 1, when combined with the cut-off arrangement described in the first claim.

497.—John Whitten, of Boston, Mass., for an Improvement in Fracture Apparatuses:

I claim an improved splint as made not only with thigh and calf rests, B C, hinged together, but with a footpiece, H, and straining screws, and an adjustable thigh slide, L, and crotch cushion, M, applied to the two rests, substantially in manner and so as to be capable of operating as described.

498.—R. A. Wilder, of Cressona, Pa., for an Improved Machine for Breaking Coal:

I claim, first, So constructing and arranging a rotating toothed disk in a coal-breaking machine as that it shall serve the purpose of a coal breaker as well as form one of the sides of the hopper into which the coal to be broken is thrown, substantially as described.

I also claim, in combination with a rotating toothed disk, forming one side of the hopper, a perforated plate or plates, F, forming the bottom of said hopper, substantially as described.

I also claim hinging the bottom of the hopper, F, at its middle, and adjusting it at its ends, for the purpose of passing coal to or from the center, or to or from the larger and smaller openings in it, so as to break the coal of greater or less sizes, substantially as described.

I also claim, in combination with the rotating disk and the perforated bottom, the curved shroudings, E, as and for the purpose described.

I also claim constructing and operating a coal-breaking machine so that the teeth or knives of one rotated vertical disk shall pass the teeth or knives of the other rotated vertical disk in opposite directions, so that they may strike the coal that comes between them on opposite sides at the same moment, for the purpose of cracking the coal into pieces and preventing the waste by crushing or pulverizing, substantially as described.

499.—Frederick Wilford, of Eagle, Wis., for an Improved Apparatus for Walling Wells, Cisterns, &c., with Grout:

I claim, first, A hollow cylinder, to be constructed in two main parts and hinged together, in combination with the movable or swinging stave and the stretchers or extension braces, to be constructed and operated substantially as described and set forth; and—

Second, The movable or swinging stave in combination with the stretchers or extension braces and connecting rod; the whole to be constructed and operated substantially as described and set forth.

500.—W. T. Williams, of New York City, for an Improvement in Animal Traps;

I claim the flaps, d d, and levers, f f, in combination with the supports, e e, in the manner and for the purposes specified.

And I claim the valve, c, in combination with the flaps, d d, and supports, e e, acting in connection with the receptacle, a, as and for the purposes set forth.

501.—Charles Wilson, of Brooklyn, N. Y., for an Improvement in Tightening Ropes on Cotton Bales:

I claim the arrangemet of the windlass, C, and attached hollow cone, D, with the sliding cone, F, weighted lever, I, fork, G, collar, C, and shaft, B, in the manner and for the purposes shown and described.

[The object of this invention is to obtain a machine which may be readily connected to the ropes of a cotton bale, and power applied effectively for drawing the ropes tightly around the bale after it is compressed and before its removal from the press—the parts being so arranged that they will be under the complete control of the operator, and the device rendered capable of being manipulated with the greatest facility.]

502.—A. H. Wood, of Boston, Mass., for an Improvement in Gas Burner Regulators:

I claim a regulator for gas fixtures, gas burners, &c., constructed and arranged substantially as described, so as to constitute not only a throttle valve but also a receptacle or basin susceptible of removal for cleansing, for receiving the condensed matters or tarry products evolved from the gas.

503.—D. B. Woodward, of Ercildoun, Pa., for an Improvement in Horse Rakes:

I claim the rocking frame, A1, having the teeth, i i i i, applied to it in the manner described, in combination with the rockshaft, O, cam wheels, D D, bar, B, and ratchet wheels, A2 A2—these several parts being constructed and arranged for joint operation in the manner and for the purposes specified.

504.—P. H. Woolsey, of Andes, N. Y., for an Improvement in Feeding Tapering Lumber to Rotary Planers:

I claim providing the swinging or moving frame, E, with a yielding joint at E′, the same operating therewith substantially in the manner described and for the purpose specified.

505.—Arcalous Wyckoff, of Elmira, N. Y., for an Improved Machine for Cutting Wooden Troughs:

I claim the combination and arrangement of two annular cutters or cutting cylinders, B C, one being of larger diameter than the other, and both cutting concentrically, for the purpose of forming a succession of gutters or eaves troughs, finished inside and outside from each piece of plank or scantling, the outer portion of one being taken from the core of the next, while a crescent-shaped piece is saved between the kerfs of the two cutters, to be utilized, substantially as specified.

I also claim, in combination with the described cylindrical cutters, B C, edge cutters and trimmers, e e and f f, arranged substantially in the manner and for the purposes shown and described.

I also claim the arrangement of the wings or flanges, d d, extending back upon the cutting cylinders from the heels of the cutting edges, i i, in combination with the said cutting edges, so as to keep the same and the throats between them immediately and continually unobstructed by the chips as fast as formed, substantially as specified.

506.—J. E. Atwood, of Mansfield Center, Conn., and Lewis Leigh, of Seymour Conn., assignors to themselves, J. C. Atwood, of said Mansfield Center, Conn., V. A. Messinger, of Boston, Mass., and V. A. Messinger, of Canton, Mass., for an Improvement in Machines for Sorting Silk Thread:

We claim, first, The stop motion consisting of the pins, l l′, in the indicator, D2, the notched lever, L, and the lever, M, the whole applied and operating substantially as described, in combination with each other and with the winding bobbin and its driving apparatus.

Second, The screw, d, and stop, e, applied in combination with the lever, D2, substantially as and for the purpose specified.

Third, The adjusting screw, E, applied and operating in combination with the lowest of the levers carrying the gaging rollers, substantially as and for the purpose set forth.

507.—C. W. Cahoon (assignor to J. B. Cahoon), of Portland, Maine, for an Improvement in Lamps:

I claim the combination of chimney fastenings with a thumb lever, substantially as described, so that the chimney may be withdrawn by pressure upon the lever.

I also claim the combination of a guard with the thumb lever, the said guard being located between the chimney and that end of the lever to which pressure is applied, substantially as described.

I also claim the combination of a spring with a thumb lever fitted with chimney fastenings, substantially as described.

I also claim the combination of a chimney guard with a thumb lever substantially as described.

I also claim the combination of an opaque lamp body with a transparent plate, substantially as described.

508.—J. H. Gould, of Philadelphia, Pa., assignor to H. E. Wallace, of ——, for an Improvement in Packing for Steam Engines:

I claim the application of india-rubber, steel springs, or other elastic substances, in combination with the alloy the composition of which is given above, in the manner and form set forth, to produce a steam-tight joint.

509.—D. F. Haasz (assignor to himself and Thomas Nash), of Philadelphia, Pa., for an Improvement in Apparatuses for Ascertaining the Fares taken on Public Conveyances:

I claim a box, A, its two compartments, C and D, the zig-zag passage, a, valve, e, shield, f, and the sliding door, B, or its equivalent, the whole being arranged as and for the purpose set forth.

510.—George Herdtfelder (assignor to himself and Charles Lammrich), of New York City, for an Improved Underground Receptacle for Waste Matter:

I claim the receptacle for ashes, garbage, &c., formed of the box, c, and covers, f, in combination with the chamber, g, and pipe, i, for the purpose and as specified.

511.—I. H. Hobbs (assignor to himself and W. H. Clark), of Philadelphia, Pa., for an Improvement in Ruling Guides for Fountain Pens:

I claim the application to a fountain pen of the lateral projection or ruling guide, g, the same being constructed and applied to an adjustable tongue, C, so as to operate substantially in the manner and for the purpose specified.

512.—L. P. Mara (assignor to J. B. Murray), of New York City, for an Improvement in Newspaper Wrappers:

I claim combining with a newspaper wrapper a dried marginal coating of gum acacia or other suitable adhesive material, substantially as described.

513.—G. W. McMinn, of Covington, Ky., assignor to himself and R. T. Riley, of Cincinnati, Ohio, for an Improvement in Metallic Springs:

I claim, first, Forming the leaves of a metallic spring with alternate bosses, B, and depressions, C, adapted to rest one within another, in the manner and for the purposes set forth.

Second, In the described combination with the above, I claim the clamp, D E, adapted to confine or release the parts of the spring, in the manner set forth.

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514.—Herrman Müller and Charles Majer (assignors to themselves, Fritz Kasefang and Louis Beauche), of New York City, for an Improvement in Cigar Machines:

We claim, first, The fixed concave surface, G, in combination with the rollers, E and F, closing roller, D, and knives, r r—the whole being constructed and operated in the manner and for the purpose substantially as described.

Second, The fixed concave surface, P, in combination with the two side rollers, N and O, the fork, L, and the sliding plate, M—the whole being constructed and operated in the manner and for the purpose substantially as set forth.

Third, The sliding board, M, with its rack, R, and its soft cover, m, for the rolling of the outer leaf, substantially as described.

Fourth, The fork, L, spring, i, fitting over the cigar during the rolling up of the outer leaf, substantially as described.

515.—William Turner (assignor to J. Y. Norton and J. Philips), of Phœnixville, Pa., for an Improved Lubricating Compound:

I claim the use of this compound for lubricating purposes.

516.—T. H. Dodge, of Washington, D. C., for an Improvement in Mowing Machines:

I claim, first, The combination with the drag bar or shoe and heel of the finger beam, of E. Ball's "Ohio Mower," patented December 1, 1857, of a lifting lever and cord or chain, whereby the driver can cause the heel of the finger beam to rest very lightly on the stubble or ground or be raised entirely above both.

Second, I also claim extending the drag bar back, so as to permit the finger beam to fold over in rear of the driver's seat, in combination with a rear extension piece for its support, substantially as described.

RE-ISSUES.

33.—M. A. Howell, Jr. (assignee of J. H. Elward), of Ottawa, Ill., for an Improvement in Mole Plows. Patented Nov. 13, 1860:

I claim, first, In combination with a plow or machine for purposes of undergr ound draining, a stationary coulter, and a coulter the fron t edge of which may be moved laterally, for the purpose and substantially as described.

Second, The sections, e d and c, in combination with the coulters, a and b, when arranged as and for the purposes set forth, substantially as described.

Third, The movable coulter, a, in combination with the side draft, as applied at the link or loop at f, on the side of the beam, A, through either of the slots in the transverse piece upon the forward end of the beam, A, for the purposes substantially as set forth and described.

[See engraving on another page.]

34.—S. H. Ransom & Co, of Albany, N. Y., assignees of Washburn Race, of Seneca Falls, N. Y., for an Improvement in Registers for Stoves. Patented April 4, 1846:

We claim connecting the expansion rod with the register in the manner substantially as described and for the purpose specified.

35.—C. B. Hoard, of Watertown, N. Y., for an Improved Method of Winding Timekeepers by Currents of Air. Patented April 3, 1860:

I claim winding a clock or other timekeeper by means of a current of air produced by a pipe, flue, or other artificial channel, employed for ventilation, or otherwise actuating an air motor.

36.—P. H. Jackson, of New York City, for an Improvement in Ships' Winches. Patented August 7, 1855:

I claim the pawl, 4, and counterweight, 6, constructed as specified, so hat the pawl can be reversed by turning it under the center, 5, and the counterweight will cause the said pawl to act upward on either side of the center, as set forth.

I claim the ratchet wheel, 3, of a windlass or winch, and the reversible pawl, 4, below said wheel, in combination with a double-acting heaver, as specified, by which arrangement a windlass or winch can be rotated in either direction by the use of one ratchet wheel, as described and shown.

I also claim the pawl, a, formed with two arms or points, as set forth, in combination with the socket or plate receiving the handspike or heaver, said pawl being reversible in the manner specified, so that the arm not in action becomes a counterweight to the arm or point taking the ratchet teeth, as set forth.

37.—Suspended.

38.—William Wharton, Jr., of Philadelphia, Pa., for an provement in Transferring Cars from one Track to Another Patented Sept. 18, 1860:

I claim the employment, in connection with sidings or turnouts on railways, of a supplementary inclined or curved guide rail, in combination with car wheels so constructed as regards the said supplementary rail which is so arranged in respect to the rails of the main track and those of the siding that the wheels may be transferred from the control of the rails on one track to that of the rails of the other, by a lateral thrust caused by the wheels bearing against the side only of the said guide rail, as set forth.

DESIGN.

John Long, of Massillon, Ohio, for a Design for a Cooking Stove.

Notes and Queries

W. A. H., of R. I.—We have no other knowledge of the heel attachment than that contained in Mr. Aiken's claim.

W. McC., of Miss.—We know of no mode of making the color of polkberries permanent.

J. T., of C. W.—If you want to learn to take photographs, you had better apply to some one familiar with the art to teach you.

T. D. J., of Mich.—Smoke will fall whenever it becomes as cool as the air.

W. F. D., of Mass.—We have known cement cisterns to be used for warm water, and know no reason why they should not be suitable to hold boiling hot water, as cement consists of lime, silica and alumina, calcined.

J. T., of Ill.—We suspect that all others who may try it will find your plan for transferring fur from the natural skin to sheets of india-rubber impracticable as well as yourself.

B. R. E., of Iowa.—Artificial noses have been made by cutting a strip from the forehead and grafting it upon the nose. If you would like to go through this operation, you can apply to some surgeon in your neighborhood. We suppose an artificial bridge could be made of india-rubber, but we do not know of any person engaged in the manufacture.

J. K., of Mass.—Send us your address, and we will forward you our pamphlet of advice to inventors. The tables which you ask for, giving the expansion of different metals with heat, &c., we shall probably publish soon.

W. P. K., of Mass.—Your request to publish an article on church organs will be duly considered. It is a subject in which very few of our readers feel an interest.

W. R., of Me.—We know of no beam engines now in operation with the connecting rod arranged as you propose; but such engines have been described in the earlier works on the steam engine, and we saw one in operation about 20 years ago.

J. M., of Wis.—We do not know of any one who is engaged in manufacturing the patent alarm bedstead of J. C. House. In Vol. XI. No. 4 (old series), you will find an engraving of it, representing a sluggard in the act of being thrown upon the floor by the mechanical attachment of the bedstead.

A. E. T., of Ohio.—The bit of stone you send us is probably quartz, but the piece is not large enough to permit a thorough examination.

R. T., of Pa.—By boiling a piece of cloth composed of cotton and wool for several minutes in moderately diluted sulphuric acid, the cotton will be destroyed, while the wool will scarcely be affected. This is one method that is employed to detect cotton in suspicious woolen fabrics.

B. & S., of C. W.—We advise you to address the Collinsville Company, Collinsville, Conn. They are making cast-steel plows.

H. W. T., of Mass.—We do not believe that the tables you speak of would be of general interest to our readers.

J. F. DeN., of S. C.—By an advertisement in another column you will see that you can get sulphate of ammonia in a crude form for manure from Dodge, Colvill & Olcott, No. 188 Pearl-street, this city.

J. F. H., of Ky.—On page 345, Vol. II. (new series) of the Scientific American, two processes of extracting aluminum from its ores are described.

A. E. W., of N. Y.—By referring to No. 18, Vol. I. (new series), you will find an engraving and notice of such a plate as you want.

T. C. H., of N. Y.—If you will procure a copy of our recent edition of the Patent Laws you will find all the information you need on the question of the abandonment of an invention. The price of the pamphlet is 25 cents.

J. D. A., of Ohio.—You should put your deed on record before commencing a suit for infringement. By procuring a copy of the Patent Laws and Information published by us (price 25 cents) you will find an answer to your inquiry about the use of patented inventions.

H. G., of Penn.—As you suggest, a tank of water as a target in experiments with artillery might furnish a very accurate measure of the penetrating power of the shot, from the perfectly uniform and homogeneous character of the substance penetrated. But would not the inconvenience resulting from the escape of water through the shot holes be an insuperable objection to the use of such a target?

J. M., of Texas.—It would occupy too much of our space to describe the mode of making stearine candles from tallow, but you will find the process fully described in Morfitt's work on soaps and candles, published by Parry & McMillan, of Philadelphia.

W. J. B., of Ala.—The sheet metal which you call "crystallized tin" is sheet iron coated with zinc, and is called "galvanized iron." It is not produced by an acid, as you suppose, but by preparing the sheet iron in a peculiar manner and dipping it into molten zinc. You will find the process fully described on page 269, Vol. XII. (old series), of the Scientific American.

S. M. L., of Ky.—The fly-wheel of your sawmill to which the pitman is attached does not appear to be properly balanced, and this may account for the jumping of the other wheel and the wear of the journal on the side to which the pitman is attached. Secure a balance weight on the rim of the wheel opposite to the pitman connection, and see what effects will result.

J. McC., of Ala.—Carbon or hard coal is insoluble in acids and all other common solvents. Soapstone is decomposed with muriatic acid, but it is not useful for any purpose known to us except in its solid pure state.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Feb. 23, 1861:—

W. F., of Conn., $30; W. & G., of Fla., $300; L. G., of La., $20; L P., of Conn., $10; J. A. W., of Miss., $30; C. D., of N. Y., $25; E. B., of N. Y., $57; L. L. K., of Mass., $58; A. S., of N. Y., $25; T. C., of Cal., $35; A. N., of Pa., $25; C. P. W., of N. Y., $55; J. O. W., of N. Y., $58; C. M. L., of Ohio, $25; J. P. T., of Md., $55; H. J. H., of Ill., $25; J. W. & J. S. H., of Ill., $25; J. B. S., of N. Y., $25; McC. & B., of Mo., $25; E. G., of Mass., $25; W. H. G., of N. Y., $25; L. S., of Vt., $55; J. & R., of N. Y., $30; G. S. C., of Ill., $30; C. A. W., of Mass., $30; N. F. M. of R. I., $20; D. B., of Ill. $30; J. L., of Mass., $30; G. W. B., of N. Y., $30; W. T. A., of Iowa, $15; S. M. D., of Mass. $30; C. N. B., of Pa., $25; I. S., of N. Y., $20; P. H., of Pa., $25; W. H. D., of Cal., $40; C. C., of Ill., $12; E. B. S., of Conn., $55; S. M. G., of Vt., $25; G. G. L., of Del., $25; W. B. Q., of Ill., $25; D. F., of N. Y., $25; J. A. De B., of N. Y., $25; J. N., of N. Y., $25; H. P., of N. Y., $25; J. B, S., of Conn., $15; L. & W., of N. Y., $30; J. R. R., of Mass., $165; J. V., of Mich., $25; B. R., of Mass., $25; G. N. C., of Conn., $25; G. B.B., of Conn., $30; W. H., of Pa., $30; H. McK., of Ala., $30; W. J. P., of N. Y., $30; W. W. R., of Wis., $30; C. T. B., of Mass., $30; E. H. L., of N. Y., $10; C. H., of La., $62, M. A. S., of Ill., $35; G. & S., of Mass., $25; J. H. G., of Pa., $25; J. B. P., of Miss., $25; D. L., of N. Y., $25; A. Q., of N. Y., $30; C. W., of S. C., $25; G. W. B., of N. Y., $25; R. & W., of N. Y., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Feb. 23, 1861:—

C. H., of La.; M. A. S., of Ill.; E. G., of Mass.; W. & J., of Mich.; B. R., of Mass.; G. N. C., of Conn.; W. T. A., of Iowa; P. H., of N. Y.; G. W. B., of N. Y.; T. S. W., of Pa.; J. P. T., of Md.; D. F., of N. Y.; A. M. G., of N. H.; A. Q., of N. Y.; A. A., of Ill.; A. L. B., of Mass.; C. N. B., of Pa.; A. N., of Pa.; C. C., of Ill.; E. B. S., of Conn.; D. L., of N. Y.; J. A. DeB., of N. Y.; W. H. G., of N. Y.; C. S., of N. Y.; J. N., of N. Y.; R. & W., of N. Y.; H. P., of N. Y.; C. M. L., of Ohio.

New Books and Periodicals Received.

The Medical and Surgical Reporter.—S. T. Butler, M.D., and R. J. Lewis, M. D, editors and proprietors, Philadelphia. This valuable publication contains a good deal of information, which is interesting to the non-professional reader as well as that which interests physicians alone.

A Comprehensive Grammar of the English Language. For the Use of Schools. By Simon Kerl, A.M. New York: Phinney, Blakeman and Mason; Buffalo: Breed, Butler & Co. 1861. This grammar is even worse than Lindley Murray's.

Bryant and Stratton's Commercial Arithmetic.—New York: Phinney, Blakeman & Mason, No. 61 Walker-street; Buffalo, Breed, Butler & Co., No. 188 Main-street.

There is a great mass of practical information in this book, but the definitions are about as puzzling and difficult of comprehension as it is possible for words to make them.

Important Hints to Our Readers.

Back Numbers and Volumes of the Scientific American.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

Patent Claims.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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IMPORTANT TO INVENTORS.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the Scientific American inform their patrons that they are still engaged in preparing specifications and drawings and attending to the wants of inventors in every department before the Patent Office, such as Extensions, Appeals, Interferences, correcting imperfect papers submitted to the Patent Office by incompetent persons, examining into the novelty of inventions, arguing rejected cases, &c. The long experience Messrs. MUNN & CO. have had in preparing specifications and drawings, extending over a period of sixteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK-ROW, NEW YORK. We have also a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

Messrs. MUNN & CO. are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we may safely say that seven-eighths of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent in Great Britain.

A pamphlet of information concerning the proper course to be pursued in obtaining patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office, or either of the Branches. They also furnish a Circular of Information about Foreign Patents.

The annexed letters, from the last three Commissioner of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly, CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully, Your obedient servant, J. HOLT.

Messrs. MUNN & Co.:—Gentleman: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, Your obedient servant, WM. D. BISHOP.

Messrs. MUNN & Co. cordially invite persons visiting the city, or residents, to call at their spacious offices, No. 37 Park-row, and examine the models which are on exhibition, or refer to the works of reference contained in their library, access to which can be had at all hours.

Inventors can communicate in German, French, Spanish, or nearly any other language, in soliciting information from this office. Circulars of information regarding the procuring of patents, printed in German, may be had on application.

Communications and remittances should be addressed to MUNN & CO., Publishers, No. 37 Park-row, New York.

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5.000 ACRES OF THE CHOICEST FARMING lands in Eastern Texas in exchange for improved property. For particulars address Box 83, Putnam, Ohio. 9 4*

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(first door from Broadway), in order to afford greater facilities and a more central location, demanded by the rapid increase of confidence in the Graefenberg Theory and Practice. The Graefenberg Theory and Practice, and the use of their medicines, together with complete symptoms of all diseases incident to this country and climate, the best method for their prevention and cure, will be found in the GRAEFENBERG MANUAL OF HEALTH.

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The State is rapidly filling up with population; 868,026 persons having been added since 1850, making the present population 1,722,663—a ratio of 102 per cent in ten years.

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The agricultural products of Illinois are greater than those of any other State. The products sent out during the past year exceeded 1,500,000 tuns. The wheat crop of 1860 approaches 35,000,000 of bushels, while the corn crop yields not less than 140,000,000 bushels.

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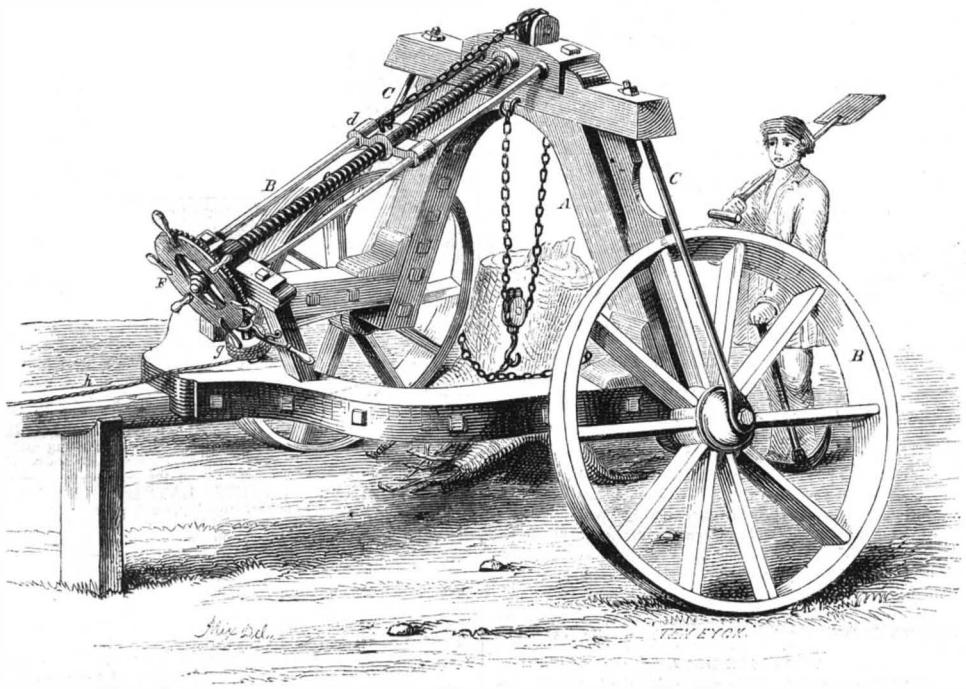
Improved Stump Extractor.

The accompanying engraving represents a stump extractor permanently mounted on wheels, so that as soon as it has performed its work in one place, it is ready to be removed to another; and in which the pulley, screw and lever are combined to multiply the power to any desirable extent. The engraving illustrates the machine in the operation of extracting a stump, but it is equally applicable to raising rocks or other heavy substances. A stout frame, A, is supported on two wheels, B B, which are inclined outward at the bottom, so as to give a broad base to the machine to prevent it from being upset, and to prevent the wheels from interfering with the extracting of the stump. The axles of the wheels are braced at their outer ends by stiff rods, C C, to prevent them from being bent or broken by the great downward pressure upon them. A pulley block is attached to the stump



LYONS' IMPROVED STUMP EXTRACTOR.

to be extracted, and through this block passes a chain which is secured to the top of the frame at one end, while the other is led over a roller at the top of the frame and connected to the nut, *d*. Through the nut, *d*, passes the long screw, *e*, which is connected by smooth journals to the frame, and has the hand-wheel, F, rigidly secured to its lower end, so that by turning the screw the nut, *d*, and the end of the chain which is attached to it are drawn down, thus raising the stump from the ground. If no very great power is required to raise the stump, the screw, *e*, may be turned by hand; but if the resistance is too great to be thus overcome, then a further multiplication of power is employed to turn the wheel, F. To this end, a beveled pinion is arranged to mesh into a beveled gear upon the wheel, F, and around the drum, *g*, on the shaft of this pinion is wound the cord, *h*, to which oxen or a horse may be attached, thus turning the wheel, F, with very great power. The pinion may be thrown into or out of gear at will. The nut, *d*, is prevented from turning by the smooth rods which pass through its two wings.

The prominent advantages of this machine are its perfect portability (being always mounted on its wheels) and its almost irresistible lifting power.

Application for a patent for this invention has been made through the Scientific American Patent Agency, and further information in relation to it may be obtained by addressing the inventor, J. B. Lyons, 48 Washington street, Baltimore, Md.

Cheap Cisterns and Filters.

The following information on this important topic, taken from the *American Farmer*, is contributed by John Milkinson, landscape gardner and rural architect, and will be found very useful for farmers :—

A cistern of the dimensions that I shall describe will hold one thousand gallons, will cost but eight dollars, and its capacity may be doubled for less than fifty per cent additional cost. One of this size will be found sufficient for farmers' families generally, and will insure soft water, which is rare in wells. The following are the directions for excavating cisterns : Stake and line out a plat near the building 8 by 10 feet; excavate this one foot in depth; then set the lines in 18 inches on all sides; then excavate all within the lines, or 5 by 15 feet, to the depth of 14 feet in the middle, making the middle level some 9 inches in width, sloping the banks on all the sides and ends to the lines last placed, which will make a section of the pit either way V-shaped, except that nine inches of the bottom will be level. In digging the banks use care not to disturb the soil not thrown out. When the digging is completed, plaster the bottom, the level part, with a good coat of cement mortar, and place a board on it to stand on to do the balance of the work, cutting the board in two equal parts before laying it on the mortar. This done, plaster the entire surface on the ground to the lines last named, then remove one-half of the board and stand on the balance and build a four-inch brick wall across the pit, about in the middle, laying the bricks, which should be *soft*, (common salmon brick), in cement, but plastering neither side. Lay the wall to the line, then remove the balance of the board and put a coat of mortar where it lay. The cistern is now complete save the covering; this may be done by laying plank over the whole bedding, then on the surface of the first excavation in mortar, or splitting logs from the woods and laying them flat side down, and closing the joints with mortar. The pump pipe should be laid into one end and the leader pipe from the house gutter laid into the other before it is covered. This done, return earth enough to cover the surface at least one foot deeper in the middle than the surrounding ground; level it off neatly and sward it, and you have a complete filtering cistern for eight to twelve years.

Improvement in Sails.

We have lately patented for Capt. Wm. A. Sands, a shipmaster of this city, a very simple but highly useful method of sewing canvas together for the sails of ships. Instead of the double flat seam now in common use, Capt. Sands unites the two edges of the canvas by sewing them upon a small rope. Each seam is therefore covered and strengthened by a rope, and the hood lap of canvas no longer necessary. Among the improved results arising from the use of the invention are the following:—The sails of a thirteen hundred-tun ship commonly require 5,300 yards of canvas. By Capt. Sands' improvement a saving of 1,000 yards is effected, only 4,300 yards being necessary. An economy of nearly $300 is thus effected for material, while the *weight* of the suit is reduced nearly 5,000 lbs. The ropes render the sail more durable, as they prevent chafing. The sails are also said to be stronger at the seams than the canvas is in its body. This has been exemplified in sails which were burst by the heavy pressure of wind in a tornado, the body of the canvas being rent, while the seams remained entire. We are informed that sewing machines may be readily employed in making sails on this plan; but their use in sewing canvas on the flat seam method is too inconvenient to be advantageous. Capt. Sands' improvement appears to be one of considerable value, and there is a prospect of its extended introduction.

During a discussion which recently took place in the New York Legislature respecting the annual appropriation of the curator and taxidermist of the State Cabinet of Natural History, Mr. Chapman, in opposition, said: "When a recent Emperor of Russia came to the throne, he went to reviewing the expenditures of the royal household. Finding a charge for goose oil he investigated it, and learned that some centuries ago some goose oil had been purchased to anoint the nose of a royal baby, since which time an item of goose oil had been included whenever a baby had been born, though none had been used. This curator watching the stars, the stuffed birds, and beasts and aquaria, and the taxidermist belonged to the same category. He had found that $5,000 were paid yearly for these fossils, &c.; that the State of New York had little stuffing done for several years, and it was but a goose-oil expense after all. For the past year it appears that one stone had been added to the collection, and one duck had been stuffed.

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FROM THE STEAM PRESS OF JOHN A. GRAY.

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